



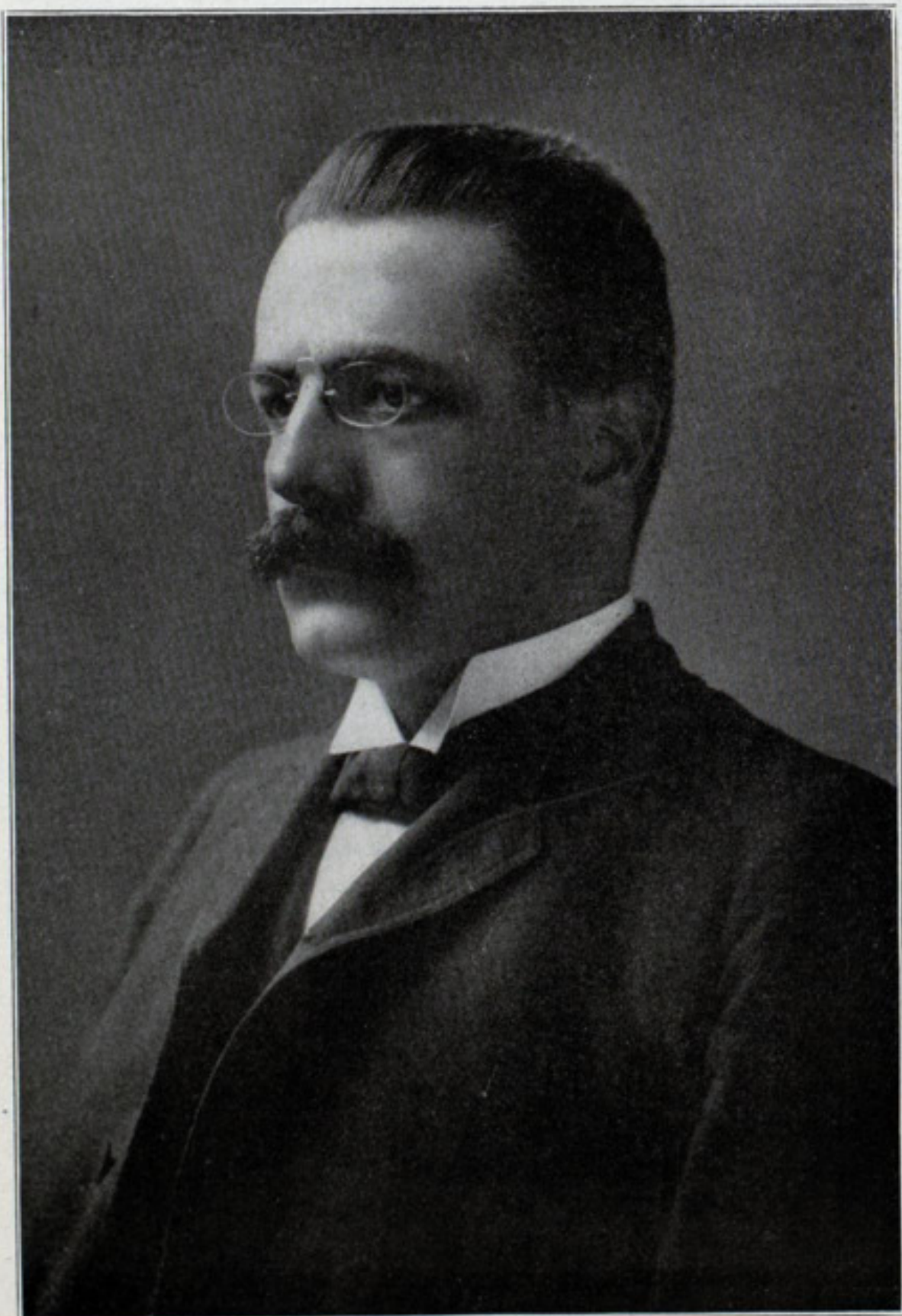
VOL. XXIX.

CLEVELAND, O., MARCH 10, 1904.

No. 10.

A Message from Secretary Cortelyou

"We should be unremitting in our efforts to win such commercial mastery upon the sea as we have won upon the land."



HON. GEORGE B. CORTELYOU,
Secretary of the Department of Commerce and Labor.

Our country, with its ample harbors on long sea-boards facing both the Atlantic and the Pacific oceans, with its great lakes system carrying a fleet larger than the merchant fleet of any other nation except Great Britain and Germany, and with its river and canal systems bringing a vast interior within easy reach of the coasts, must in time rank first among nations in water transportation as it now ranks first in land transportation.

In total tonnage we are now second only to England. Because our ship building facilities are almost wholly devoted to home transportation they do not the less add to national wealth and prestige. The Panama canal will create a demand for American sea-going cargo steamers, which may do as much for our ship builders on salt water as the development of the great lakes ore regions has done for ship builders on fresh water.

We should be unremitting in our efforts to win such commercial mastery upon the sea as we have won upon the land. If the Department of Commerce and Labor can aid in attaining this end, it will have served one of the main purposes of its creation, "to foster, promote and develop the * * * shipping * * * and the transportation facilities of the United States."

George B. Cortelyou

On Wednesday of this week Mr. Howard H. Baker celebrated his fiftieth anniversary in the ship chandlery business. The business was established seventy years ago by W. S. Waters. It has changed hands a number of times, but its present title has stood since 1882. Mr. Baker was appointed postmaster of Buffalo by President Cleveland during the second term and conducted the office with great efficiency. Buffalo has altered in many regards since this business was established, so that the headquarters of Howard H. Baker & Co. have virtually become one of the land marks of the town.

Mr. J. H. Torney has been appointed purchasing agent for the Southern Pacific Co.'s Atlantic coast steamship lines, with office at 29 Broadway, New York.

Comdr. Lucien Young, who has been in charge of the ninth lighthouse district, embracing Lake Michigan and tributary waters, with headquarters at Chicago, has been relieved and will be superseded by Comdr. Perry Garth of the Buffalo

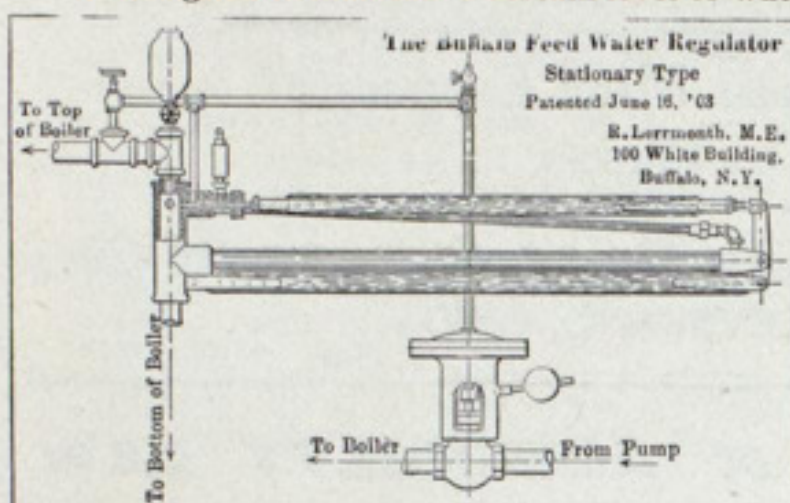
The Boston boiler makers and iron ship builders met this week and adopted a resolution urging congress to enact measures that will aid in restoring to American mechanics the building of vessels for the foreign carrying trade of the United States.

The Baltimore & Ohio railroad is planning to raise the tug Cascade which sank in the lake off Lorain harbor several weeks ago in endeavoring to rescue the barges which drifted out into the lake with a flood. The Cascade is in 40 ft. of water, but is reported to be in good condition.

Capt. Alex. Clark, founder of the Ship Masters' Association, is endeavoring to establish a home for ship masters. The general opinion of the old ship masters appears to be that the home should be located on the St. Clair river, if secured at all.

BUFFALO FEED WATER REGULATOR

is designed to maintain a certain level of water in a steam boiler.



Only natural forces operate the device which consists of the heating and cooling of a straight copper tube with its corresponding expansion and contraction. The heat is supplied from the steam in boiler and the cooling medium is the water taken from the boiler. The actuating force, therefore, is certain. By this motion a small valve is operated to increase or decrease the

pressure on a diaphragm valve which regulates the supply of water to the boiler.

The Perfect Working of this Regulator is Guaranteed.

ROBERT LEARMONTH,
100 White Building, BUFFALO, N. Y.

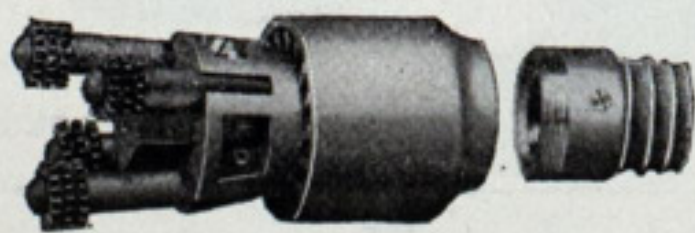
Weinland Tube Cleaners

Were conceived, developed and patented by a

PRACTICAL ENGINEER

thoroughly familiar with the requirements of such machines.

We make them for all styles of boilers and all sizes of tubes.



This style suitable for Marine Type of Water Tube Boilers. They are in successful use on government and other vessels.

We also make Damper and Feed Water Regulators and Tube Cutters.

Our Specialty being Engine and Boiler Room Equipment.

THE LAGONDA MFG. CO.,

Springfield, O.

Designs for Modern River Boats.

Having a number of designs for modern light draft steel river boats, we would be pleased to hear from parties contemplating the building of said class of vessels. Reply to Box 60, Marine Review, 39-41 Wade Bldg., Cleveland, O.

Mar 17

FOR SALE.

Complete Hull of an 80-Foot Gasoline and Sail Cruising Yacht.

Built especially for shallow water. May be used also as small freighter. Address

B. L. Averill, 130 Grant St., Painesville, O.

Mar. 17

STEAMER FOR SALE.

To close an estate. Package freight steamer, canal size, 2,200 tons capacity. Complete electric plant. Rates $A1\frac{1}{2}$. Cheap for cash. Address Executor, care Marine Review, 39-41 Wade Bldg., Cleveland, O.

Mar. 31.

Cast Steel Pipes.

We have especial facilities for making and finishing steel pipes, crosses and tees and special fittings, to stand heavy pressures and up to ten feet in diameter. Our metal averages about 70,000 pounds tensile.

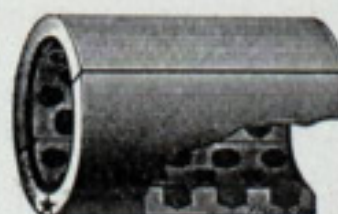
Open Hearth Steel Castings for locomotives, ship-building, electrical, pump and general machinery purposes. Subject to U. S. Government, Lloyd's, Railroad and other specifications.

Rail or Water Deliveries.

Seaboard Steel Casting Company,
Chester, Pa.

NEW METAL CARGO HOISTERS

Wrought Iron Hook and Strap, Galvanized Iron Shells and Sheaves. Sheaves fitted with Genuine Star Metaline Bushings with Metaline Side Bearings.



Star Metaline Bushing.

SELF-OILING.

These Blocks Save the Rope and Outwear all others. Send for 1902 Catalogue M. A. R. FREE.

Manufactured only by

BOSTON & LOCKPORT BLOCK CO.,
BOSTON, MASS. LOCKPORT, N. Y.



VOL. XXIX.

CLEVELAND, O., MARCH 10, 1904.

No. 10.



Str. North West

Str. Princeton

Str. Manitou

LAST SEASON

We built 29 Ships with a carrying capacity of 166,000 net tons and had contracts at close of the season for an equal number with a carrying capacity of 165,000 net tons. This leads the world's record for output from any one company.

We operate nine yards with a building capacity at one time of from 21 to 30 ships, according to size.

At various points we have 16 dry docks and 3 sets of floating ways.

THE AMERICAN SHIP BUILDING CO.

BUFFALO	LORAIN
CLEVELAND	MILWAUKEE
DETROIT	SOUTH CHICAGO
DULUTH	WEST BAY CITY



Str. Western States

NUSSER-ENG. CO. CLEVELAND

THE BROWN HOISTING MACHINERY CO. INCORPORATED

Sole makers of the "Brownhoist" High Speed Cantilever and Gantry Cranes. The most economical cranes for covering large areas in steel works or ship yards.

Machinery For Handling
Structural Work, Marine Plates, etc., in Ship Building Yards.

Coal and Ore Handling Machinery.

Cranes of all Types.
Steam, Electric and Hand Power.

Main Office and Works, CLEVELAND, O., U. S. A.

Eastern Office, 26 Cortlandt St., New York City.

Pittsburg Office, Carnegie Building, Pittsburg, Pa.

European Office, 39 Victoria St., London, S.W.

AZALEA ^{Anti-Friction} METAL

Highest Grade Bearing Metal.

...Used for...

MARINE and STATIONARY ENGINES,
MACHINERY and RAILROADS.

Send for free sample for trial.

ONCE TRIED,

ALWAYS USED.

THE VICTOR METALS CO.,

East Braintree, Mass.

New York Office, 29 B'way.

Fogg's Resilient Felt Mattresses and Cushions.

Manufactured by

M. W. FOGG,

202 Front St., N. Y.

Send for Illustrated Catalogue.



Detroit White Lead Works

DETROIT VARNISH COMPANY,

Manufacturers of

Paints, Varnishes and Specialties
specially prepared for marine use.

DETROIT, CHICAGO, BUFFALO and CLEVELAND.



Improved Bell Helmet

Established 1844.

A. SCHRADER'S SON,

32 Rose Street, NEW YORK.

Manufacturer of

Submarine Armor and Diving Apparatus.

We carry a complete stock of Dresses, Hose and Repair Sundries.

All orders filled day received.

Write for our prices.

Established 1857.

AMERICAN SHIP WINDLASS CO. PROVIDENCE, R. I.

We have completed our new IRON FOUNDRY, and are prepared to execute orders for Castings, guaranteeing first-class work, prompt service and reasonable prices.

SHIP MACHINERY EMBODYING THE LATEST DESIGNS AND MANY IMPORTANT PATENTED IMPROVEMENTS.

SOLE BUILDERS OF THE

Original and Only Automatic Steam Towing Machine.

SEND FOR ILLUSTRATED CATALOGUE.

P. O. BOX 53.

Address: FRANK S. MANTON, President.

MORISON SUSPENSION BOILER FURNACES

FOR LAND AND MARINE BOILERS.

UNIFORM THICKNESS—EASILY CLEANED
UNEXCELLED FOR STRENGTH.

Also Fox Corrugated Furnaces.

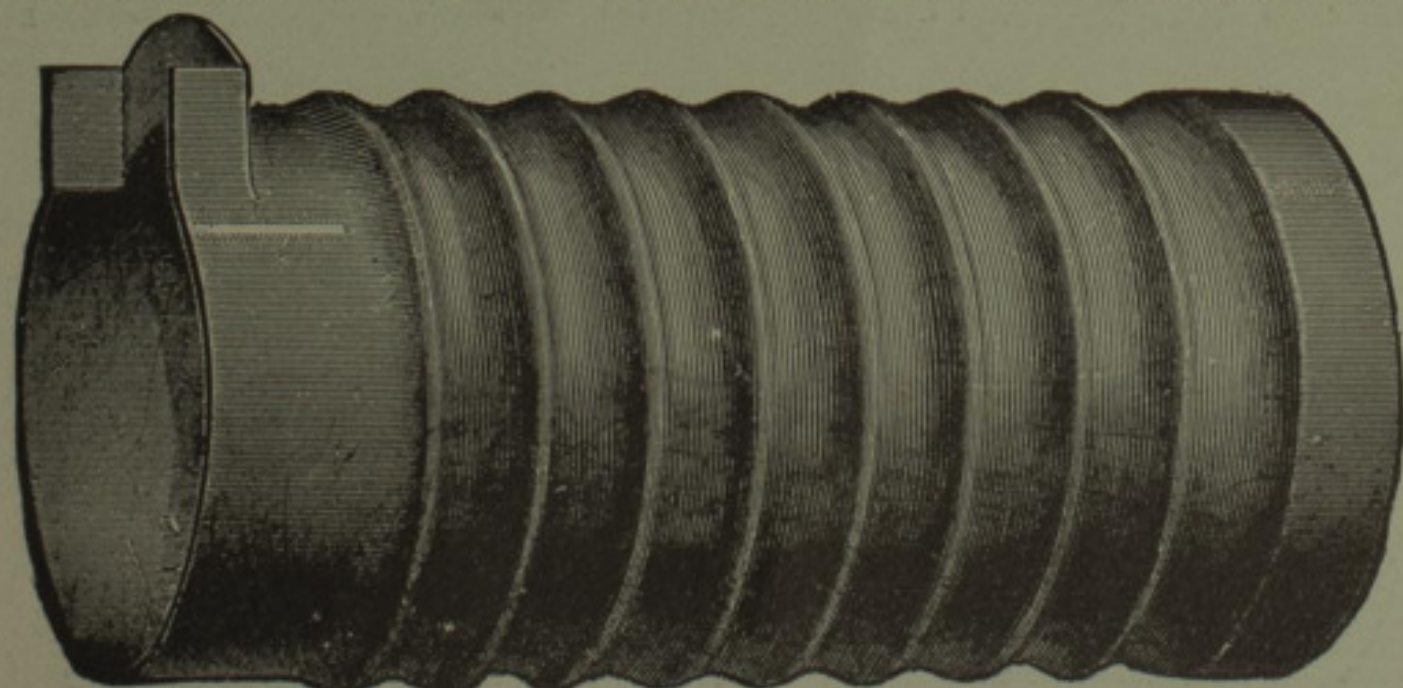
MANUFACTURED BY

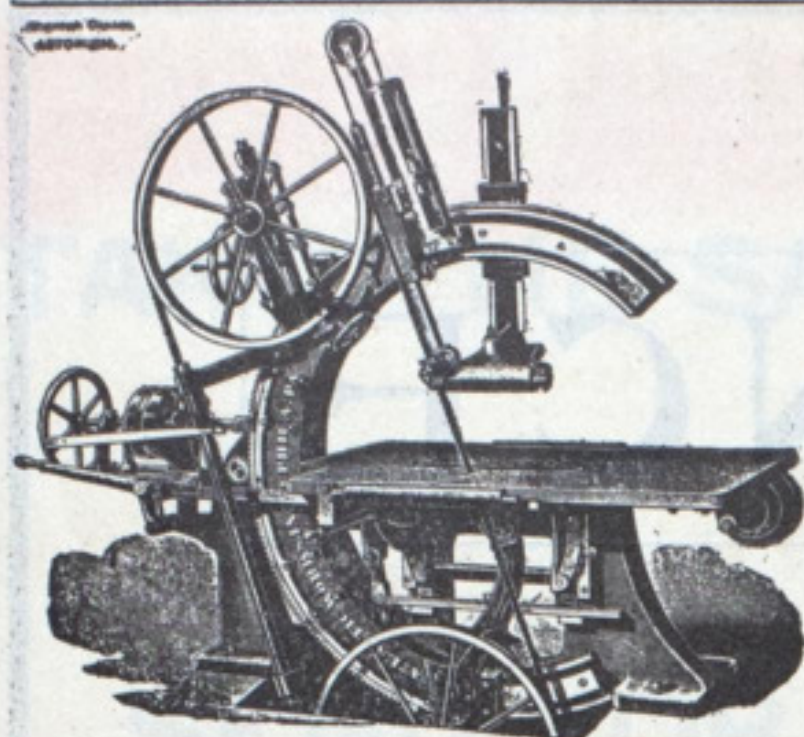
THE CONTINENTAL IRON WORKS,

West and Calyer Sts., NEW YORK.

Near 10th and 23d Sts. Ferries.

Borough of Brooklyn.





ADJUSTABLE BEVEL BAND SAW.
Will bevel both ways to 45 degrees.
Power Movement to change angles.
Power feed in three directions.

ESTABLISHED 1869.

INCORPORATED 1896.

ATLANTIC WORKS INCORPORATED,

Successors to Berry & Orton Company.

2223-25-27-29 Arch St., Philadelphia, Pa., U.S.A.

MANUFACTURERS OF

MACHINERY FOR WORKING WOOD

FOR USE IN

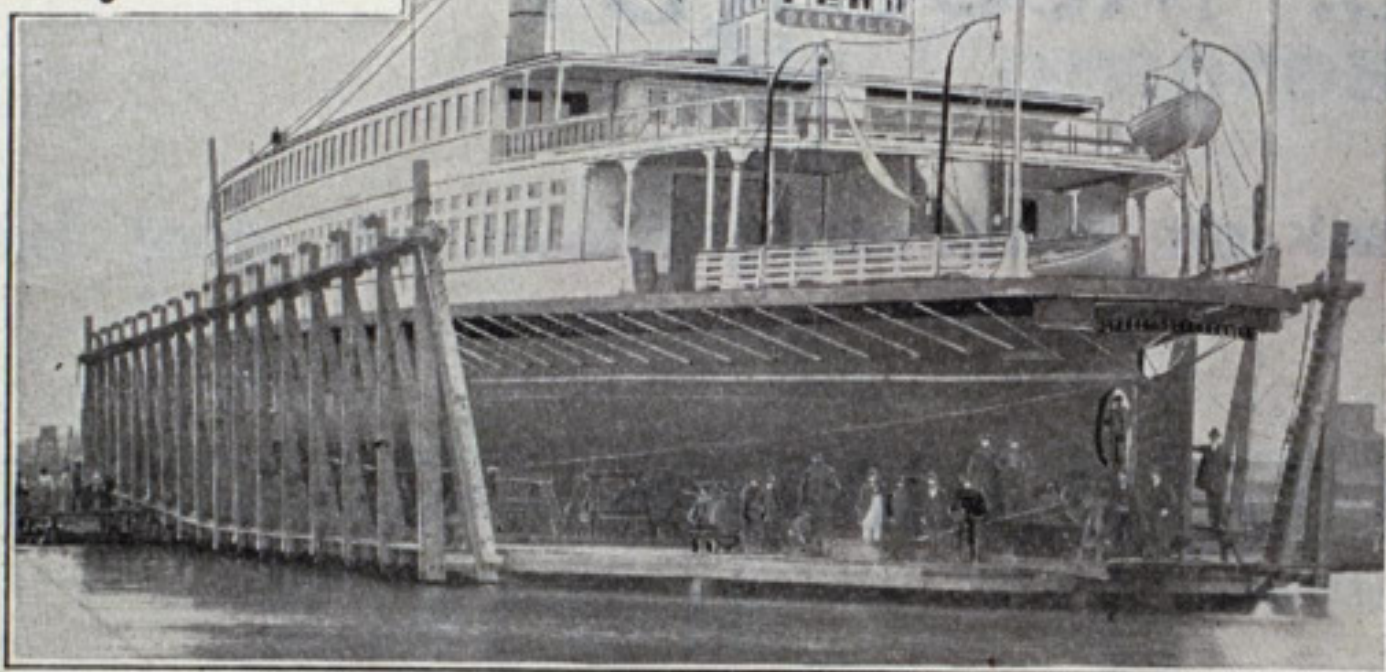
Ship Yards, Car Shops, Railroad Shops.

SEND FOR CATALOGUE.

ESTIMATES FURNISHED.

Hollow Chisel Mortisers.

Car Sill Dressers.

Best Form
—OF—
Dry Dock

Crandall's Modern Marine Ry's.

SAFE.  RAPID.BUILT of STEEL or WOOD
ANY SIZE.

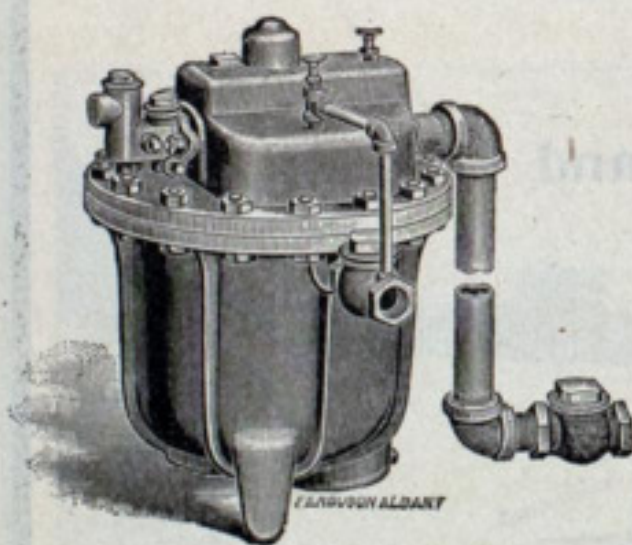
H. I. Crandall & Son Co.,

(INCORPORATED.)

Contracting Engineers.

EAST BOSTON MASS. U. S. A.

Steam Traps of all Kinds.



Class A.
Return Trap.

When you are in need of a good, reliable
Steam Trap, whether Return or Non-Return,
write us; we manufacture them for all duties.

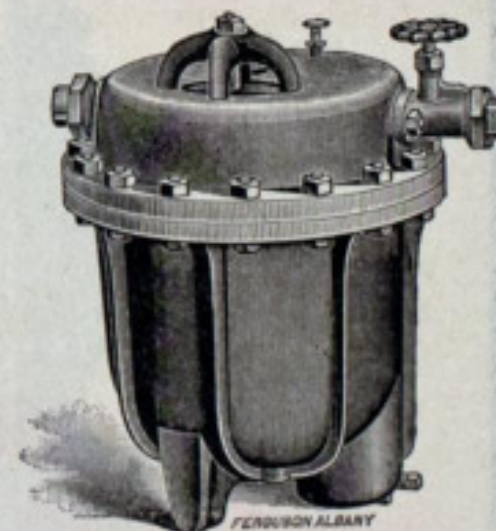
Send for Marine Catalogue.

The Albany Steam Trap Co.,
Albany, N. Y.

Established 1871.

Frederick Townsend, Pres.

James H. Blessing, Gen. Mgr.



Class B.
High Pressure, Non-Return.

The United States Shipbuilding Company

43 Cedar Street, New York

Builders of all Types of Vessels

The only Company in the world that can

BUILD, EQUIP,

ARM AND ARMOR

A Modern Battleship

without calling upon outside assistance

CAN MAKE AGREEMENTS COVERING REPAIRS OR BUILDING ON

Atlantic and Pacific Oceans

INSURANCE

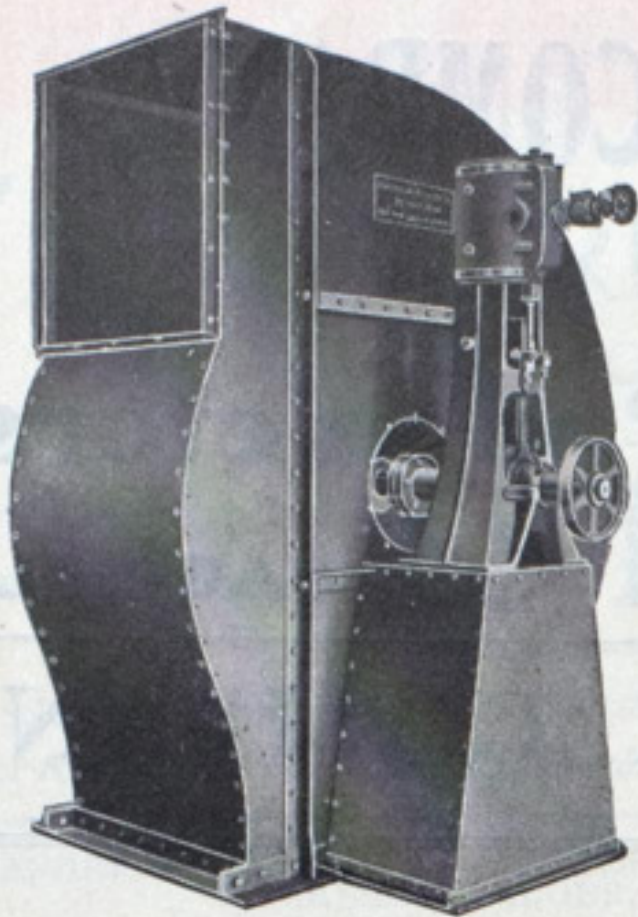
GEO. L. McCURDY

169 Jackson Boulevard

CHICAGO, ILLINOIS

Direct Representative of Leading American and
Foreign Underwriters.

HULLS AND CARGOES



The Marine Ventilating or Mechanical Draft plant
oufitted with

"A B C" Fans or Blowers

installed according to our plans and instructions, is an assured
success from the start.

Our manufacturing and engineering facilities are unexcelled.

Inquiries solicited.

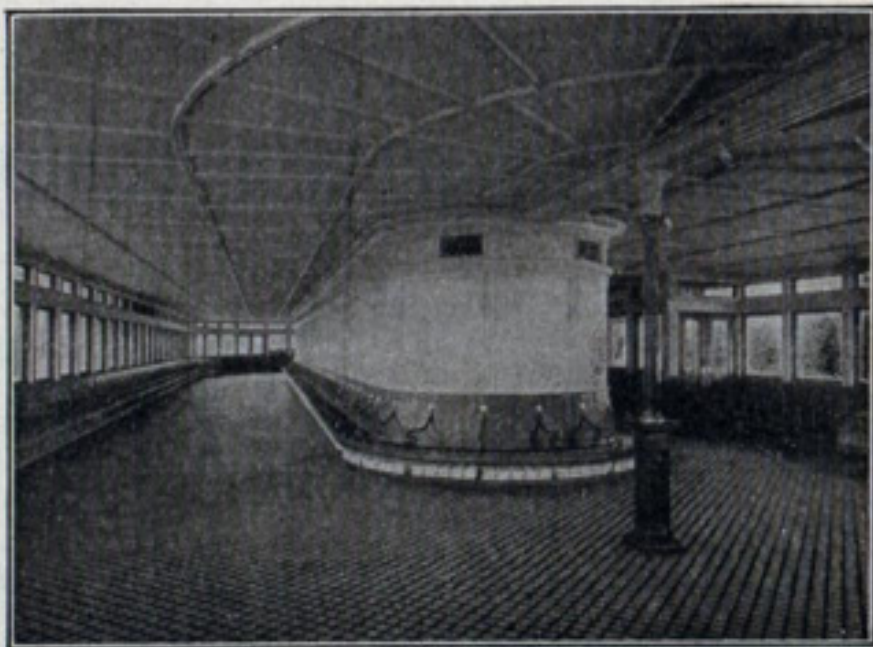
American Blower Company,
Detroit, Mich.

New York,
141 Broadway.

Chicago,
Marquette Building.

London,
70 Gracechurch St.

INTERLOCKING RUBBER TILING.



Is noiseless, non-slippery, waterproof and thoroughly sanitary, more durable than stone or earthen tiles, elegant in appearance, manufactured in a carefully selected variety of colors. Endorsed by the best architects and engineers. A perfect floor for business offices, banking-rooms, court-rooms, vestibules, halls, billiard-rooms, smoking-rooms, cafes, libraries, churches, hospitals, hotels, etc. It is especially and peculiarly adapted for Steamships, Yachts, etc. It stands the constant straining and racking without cracking or separating, and its non-slippery feature is of high value. Samples, estimates and special designs furnished upon application. **BEWARE OF INFRINGERS. PATENTED.**

MANUFACTURED SOLELY BY

NEW YORK BELTING & PACKING CO., Ltd.
25 PARK PLACE * * * * * NEW YORK

PHILADELPHIA, 724 Chestnut St. BOSTON, 232 Summer St.
BALTIMORE, 41 South Liberty St. INDIANAPOLIS, 229 So. Meridian St.
CHICAGO, 150 Lake St. ST. LOUIS, 411 No. Third Street.
SAN FRANCISCO, 509-511 Market St.
ARTHUR L. GIBSON & Co., 19-21 Tower Street, Upper St. Martin's Lane,
LONDON, ENGLAND.

THE ROBERTS Safety Water Tube Boiler Co. MANUFACTURERS OF High Grade Marine Water Tube Boilers.

Generators of the Highest Quality of Steam.

Nearly 1500 in use.

Send for Circulars and Stock Sheet.

Works:
RED BANK, N. J.
Phone, 49 Red Bank.

Main Office:
39 Cortlandt St.,
NEW YORK, N. Y., U. S. A.
Phone, 599 Cortlandt.

Cable Address:
"BRUNIVA."

Screw Propeller Computer (McDERMOTT)

For quickly determining dimensions and proportions
of screw propellers for any set of conditions.

\$5.00

TAKE THE SAFE COURSE

when in trouble, and

SEND FOR **"G"** WRECKING OUTFIT.

Lighter T. F. Newman, Detroit River, and Steamer Favorite at Cheboygan, have Pumps, Divers, Jacks, and a complete outfit aboard, including

Air Compressors,

and tools for working on iron and wood under water.

Electric Traveling Cranes.



Electric and Hand Power Cranes of all types.

Electric Hoists

. Air Hoists

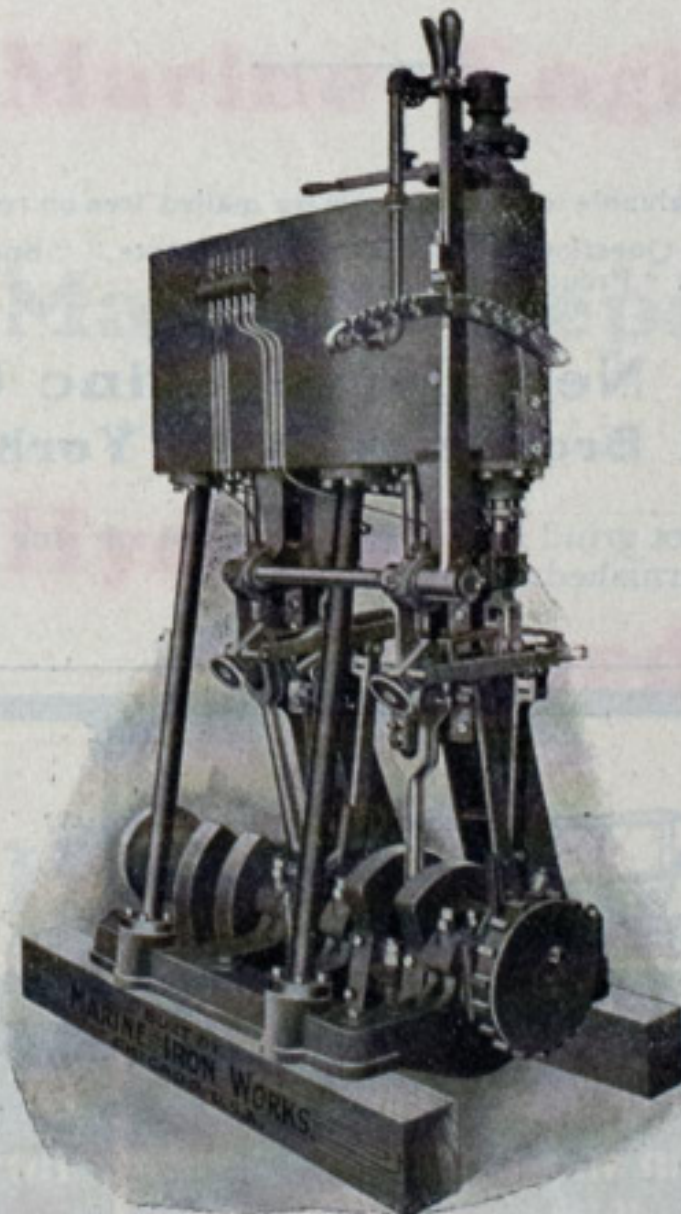
. Air Cranes.

Get our Catalog.

Northern Engineering Works,
17 Chene Street, Detroit, Mich.

Modern and
Dependable

MARINE ENGINES At Fair Prices.



8 in.—17 in. x 12 in. Compound Engine. From photograph.

Our line of Compound and Triple-Expansion Marine Engines is very complete within our range of sizes (15 to 500 H.P.) and is strictly up-to-date.

Catalogue Free on Request.

Marine Iron Works, Station A, Chicago, Ill.



SIPE'S JAPAN OIL

SUPERIOR TO LINSEED OIL FOR ALL KINDS OF PAINTING

Cheaper and more durable—Does not require the addition of Dryers, and is not affected by sulphur, or salt water.

OUR LINE OF BLACK PAINTS

FOR PAINTING STACKS, CYLINDERS AND HULLS

are widely used and highly esteemed. (Prices and samples furnished on application.)

JAS. B. SIPE & CO. SOLE MAUFACTURERS ALLEGHENY, P. A. U. S. A.

"ZINC WHITE is more oxothermic, and hence very stable and more resistant to atmospheric influences, so that painting done with it is more lasting than painting done with white lead."

—J. Giraud in OIL AND COLOURMAN'S JOURNAL.

All high grade ready mixed and combination paints are based on

Zinc White.

Pamphlets valuable to paint consumers mailed free on request :

"The Paint Question," "Paints in Architecture," "Specifications for Architects," and "French Government Decrees"

The New Jersey Zinc Co.,
71 Broadway, New York.

We do not grind zinc in oil. A list of zinc paint manufacturers is furnished on request.

KLINGER REFLEX WATER GAUGES

and "WILTBONCO" Gauge Mountings.

As supplied for all of the principal Navies of the World, Merchant Marine, and for Locomotives, Automobiles, Stationary and Portable Boilers.

NOTE—With the ordinary Gauge Glass Tube one cannot tell whether it is full or empty. When filled with WATER the REFLEX GAUGE always appears BLACK. When empty, it instantly shows WHITE. No mistake possible. This feature alone is of greatest importance.

SEND FOR CATALOGUE.

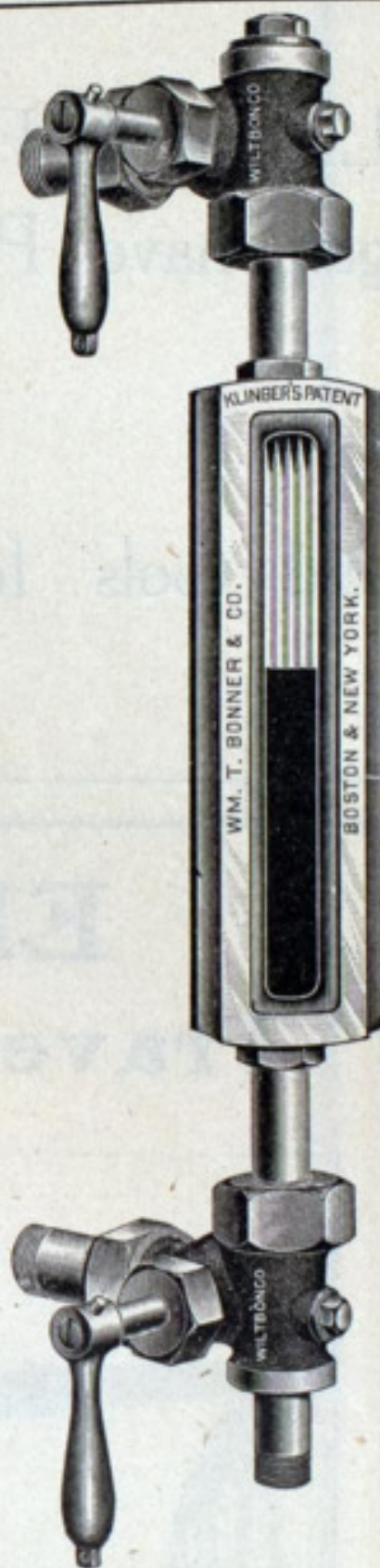
WM. T. BONNER & CO.,

ENGINEERS,
CONTRACTORS AND MANUFACTURERS,
STEAM BOILER ACCESSORIES.

53 STATE STREET, BOSTON.

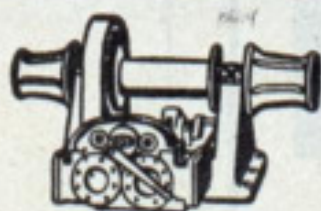
Factory: Charlestown, Mass.

NEW YORK OFFICE, 141 BROADWAY.



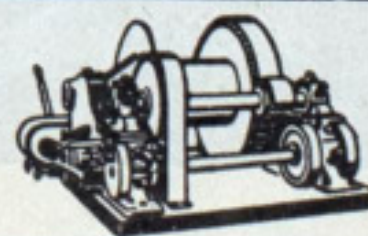
GASOLENE MARINE ENGINES

Suitable for all Boats from 3½ to 200 HP.
Over 100 in successful use.
Also the well known and always reliable Wooters Gas or Gasolene Stationary Engines.



HOISTING ENGINES

Of all kinds and sizes, and for all purposes, especially for ship use.
Docking and Hauling Engines and Wire Rope Windlasses.



AUTOMATIC TOWING MACHINES

Somewhat the cheapest, and altogether the best. Positively guaranteed.
Automatic Fog Whistle Machines
Steam Steering Engines.

FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO.

THE CHASE MACHINE CO. Engineers and Machinists, CLEVELAND, OHIO.

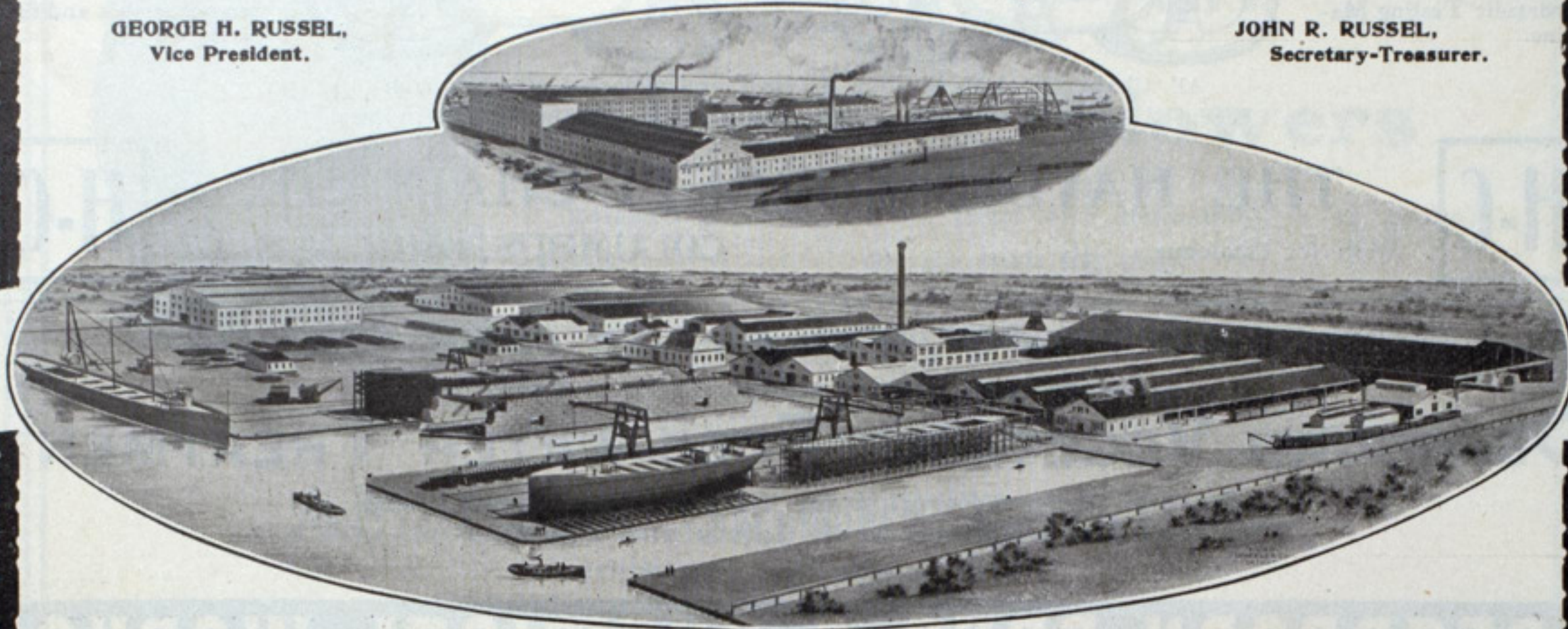
GREAT LAKES ENGINEERING WORKS

DETROIT, MICH.

ANTONIO C. PESSANO, Pres. and Gen. Mgr.

GEORGE H. RUSSEL,
Vice President.

JOHN R. RUSSEL,
Secretary-Treasurer.



Steel Ship Builders

Floating Dock

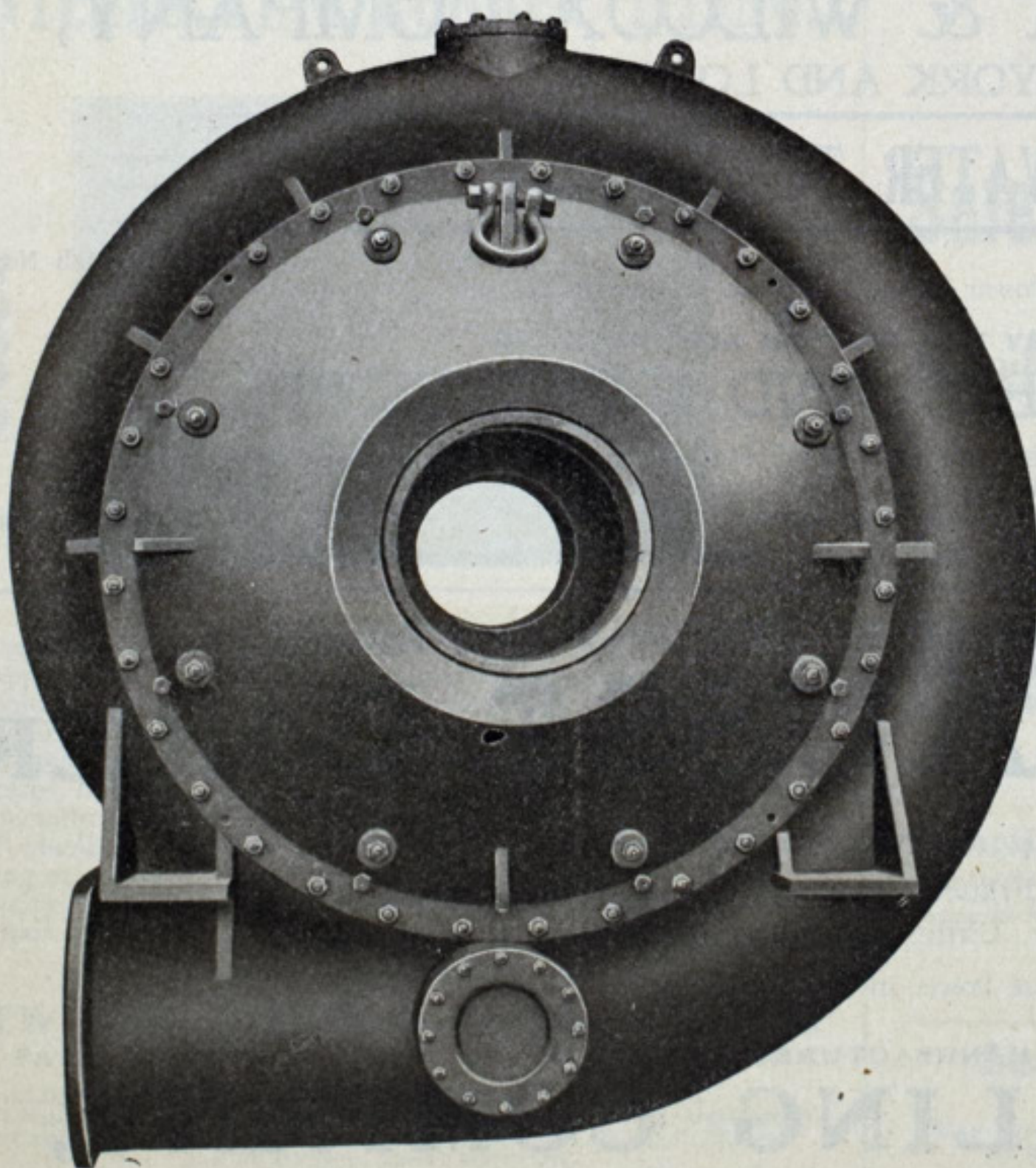
Marine Engines

Marine Repairs

**Hydraulic
Dredges**

**Hydro Carbon
System**

**Propeller
Wheels**



Centrifugal Pumps for Hydraulic Dredging, etc.

H-C HIGH GRADE CHAINS H-C

For DREDGES--STEAM SHOVELS--SHIP CABLES--MARINE RAILWAYS.

All Chain Tested on our improved 300,000 lb Hydraulic Testing Machine.



We have a large modern factory ensuring prompt service and first class product.

All Chain Hand-Made from Refined and Selected Fibrous Iron.
Licensed Tester for Lloyds. Chain Made to Fit All Makes of Windlass.

H-C THE HAYDEN-CORBETT CHAIN CO., H-C

Write for Catalogue.

COLUMBUS, OHIO, U. S. A.

YOUR FIT-OUT WILL NOT BE COMPLETE

Unless each Boat is supplied with a Barrel of

DEARBORN VEGETABLE FEED-WATER TREATMENT

Special Marine Formula for waters of the Great Lakes.

Clean Boilers mean Safety and Economy

SOLD AT PRINCIPAL LAKE PORTS.

DEARBORN DRUG & CHEMICAL WORKS

120 Liberty Street, NEW YORK.

10 Branch Offices in U. S.

27-34 Rialto Bldg., CHICAGO.

THE BABCOCK & WILCOX COMPANY, NEW YORK AND LONDON.

= FORGED STEEL WATER TUBE MARINE BOILERS =

362,000 Horse Power in the United States Navy.

186,000 Horse Power in the British Navy.

225,000 Horse Power in the American Merchant Marine.

ADOPTED BY THE BRITISH ADMIRALTY IN

LARGE CRUISERS AND BATTLESHIPS.

Orders have also been received for the navies of Italy, Russia, Norway and Denmark

No Cast Metal.
No Bent Tubes.

No Screwed Joints.
Lightness, Accessibility.

No Automatic Devices.
Safety under High Pressure.

WORKS: Bayonne, New Jersey, U. S. A. Paris, France. Renfrew, Scotland. Oberhausen, Germany.

For High-Grade Installations in the Navy and Merchant Marine

THE NICLAUSSE BOILER

609,000 Horse Power in the Navies of

England, United States, France, Germany, Japan, Russia, Italy Spain,
Turkey, Chile, Argentine Republic.

106,000 Horse Power in the United States Navy.

MANUFACTURED BY

THE STIRLING COMPANY, CHICAGO, ILL.

WILLIAM L. BROWN, President.

J. C. WALLACE, Vice-Pres.

O. R. SINCLAIR, Sec'y & Treas.

ALFRED G. SMITH, Gen'l Supt.

CHICAGO SHIP BUILDING COMPANY,

Steel Ship Builders and Dry Dock Proprietors.

Dry Dock and Yards: 101st St. and Calumet River,

CHICAGO, ILL.

MILWAUKEE DRY DOCK COMPANY

MILWAUKEE, WISCONSIN

SHIP REPAIRS

OF ALL KINDS

Two Ship Yards offer every Facility for the
Repair of both Steel and Wooden Vessels

South Yard Dock....

is 450 ft. long on keel blocks; 460 feet over all;
60 feet width of gate, and 16 feet over sill.

West Yard Dock....

312 feet on keel blocks; 45 feet width of gate,
and 12 feet over sill.

RUDDER PIT IN EACH DOCK.

ELECTRIC LIGHTS FOR NIGHT WORK.

Main Office at **SOUTH YARD,**
Foot of Washington St.

EDWARD SMITH, President.

WILLIAM KNIGHT, Asst. Sec'y & Treas.

O. T. WARREN, Superintendent.

THE BUFFALO DRY DOCK CO.

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-ton Shear Legs, and in every way Equipped

With Modern Plant for the Building and Economical Repairs of

STEEL AND WOODEN SHIPS

LONG DISTANCE TELEPHONE CONNECTIONS:

Office Telephone, 515 Seneca.
President's Telephone, 209 Bryant, Residence.

President's Telephone, 3920 Seneca, Office.
Asst. Sec'y & Treas., Telephone, 609 Bryant, Residence.

THE SUPERIOR SHIPBUILDING COMPANY

Dry Dock
and Repairs
of All Kinds

SHIP AND
ENGINE
BUILDERS

Two Largest
Dry Docks
On the Lakes

Large Stock of Material Always on Hand for Repairing Wooden and Metal Ships.

Repairing Promptly Attended
to, Night or Day.

West Superior, Wis.

W. L. BROWN,
President.

JAS. C. WALLACE,
Vice-President and General Manager.

R. C. WETMORE,
Secretary and Treasurer.

DRY DOCKS IN CLEVELAND:

No. 1, foot Weddell St., 547 ft. x 65 ft. x 15 ft. 6 in.
No. 2, foot Weddell St., 450 ft. x 50 ft. x 16 ft.

No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.
Dry Dock at Lorain, 560 ft. x 60 ft. x 17 ft.

THE AMERICAN SHIP BUILDING CO.

Office, 120 Viaduct, Cleveland, O.

Marine and
Stationary Engines

STEEL SHIPS

Boilers and
Auxiliary Machinery

Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System, as applied to boilers, giving increased power and great economy.

Prompt Attention Given to Ship Repairs of All Kinds

WORKS AT CLEVELAND AND LORAIN

ALEXANDER McVITTIE, President and Manager. WILLIAM C. McMILLAN, Vice President. M. E. FARR, Secretary and Treasurer.
CHARLES B. CALDER, General Superintendent. FRANK E. KIRBY, Consulting Engineer.

DETROIT SHIPBUILDING COMPANY,

Ship and Engine Builders, Detroit, Mich.

Sole Owners for the Lakes and Atlantic Coast of the HOWDEN HOT DRAFT SYSTEM as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Michigan.

Wooden Ship Yards and Dry Docks, Foot of Orleans Street, and Foot of Clark Avenue, Detroit, Mich.

The Jenks Ship Building Co.

STEEL SHIP BUILDERS,

MARINE ENGINES AND BOILERS.

Prompt Attention Given to Repairs of all Kinds on Ships, Engines and Boilers.

OFFICE AND MACHINE SHOPS
AT FOURTH STREET.

YARDS AT FOOT OF LINCOLN
AVENUE.

PORT HURON,

MICHIGAN.

PITTSBURG COAL COMPANY.

Steamboat Fueling Facilities at Various Points on the Great Lakes:

CLEVELAND HARBOR { 4 Car Dumpers.
3 Lighters.

FAIRPORT HARBOR { 1 Car Dumper.
1 Lighter.

ASHTABULA HARBOR { 1 Car Dumper.
1 Lighter.

ERIE HARBOR { 1 Car Dumper.
Fuel Pockets.

DETROIT RIVER BRANCH { Docks and Pockets at
Sandwich and Amherstburg.

SAULT RIVER BRANCHES { Dock and Pockets at Detour.
Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)

WE FURNISH ONLY
THE BEST GRADE OF

Pittsburg and Youghiogheny Coal.

GENERAL OFFICE, LAKE DEPARTMENT, PERRY-PAYNE BUILDING, CLEVELAND, OHIO.



**U.S.
AUTOMATIC
INJECTOR**

Many an engineer has made trouble for himself by specifying the wrong kind of injector. If you want an injector that will do its work right all the time, and under all circumstances, specify the

U. S. Automatic Injector.

Over 200,000 are in use and giving perfect satisfaction. After exhaustive tests in the government laboratory, this injector was adopted for use in the U. S. Navy. Engineers should write for our "Red Book." It answers over 500 questions that confront engineers in their daily experience, and also tells all about

U. S. Automatic Injectors.

American Injector Co.,
Detroit, Mich.

Made in the United States
Used the World over

Steamships, Government, Revenue and Lighthouse Vessels, Yachts and Boats of all descriptions

Supplied with

FURNISHINGS

"From Steerage to Captain's Cabin."

Covering everything that can possibly be required in

**Furniture,
Beds,
Carpets and Rugs,
Upholsteries,
Bedding,
Groceries,**

**Galley Ranges,
Galley Utensils,
Monogram and
Crested Linens,
China and
Glassware, etc.**

Detailed work requiring special plans or sketches carried out by expert operators.

We gladly submit Estimates free of charge.

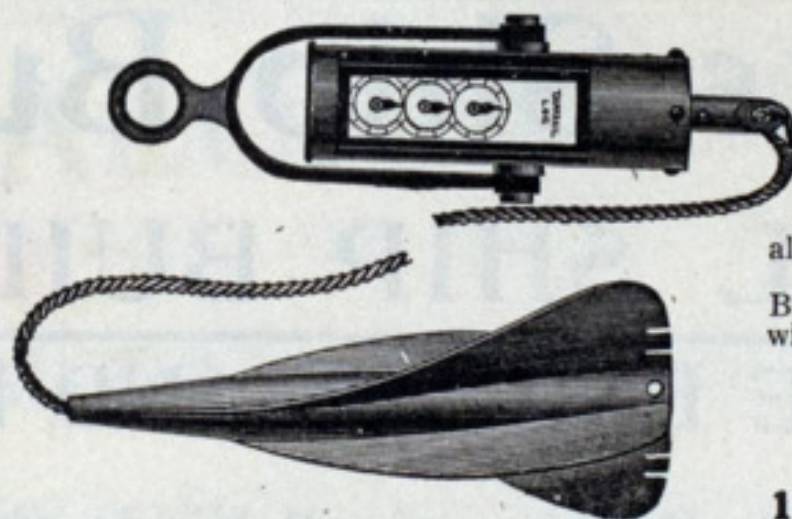
PROMPT DELIVERY OF GOODS.

Address

CONTRACT DEPARTMENT,
SIEGEL COOPER CO.,
6th Ave., 18th and 19th Sts.,
NEW YORK CITY.

Please mention Marine Review, when writing.

The **BLISS** **TAFFRAIL** **LOG**



OVER 15,000 SOLD

A portion are now made to indicate
STATUTE MILES
FOR USE ON THE LAKES.

Send us your old Bliss Register, and we will alter it to indicate statute miles for \$3.50. There are poorly made imitations of our rotator. Buy only the **Bliss Adjustable Rotator**, stamped with our name and patents.

For sale by Ship Chandlers.

JOHN BLISS & CO.,
128 Front St., - - - New York.

THE STANLEY B. SMITH COAL AND DOCK CO.

Toledo Harbor,

Toledo, Ohio.

1,800 Feet of Dock.

6 McMyler Derricks.

Capacity 3,000 Tons Daily.

FUEL LIGHTERS.

"Kanawha"—"Pennsylvania"—"Hocking"

DOCKS

Pennsylvania R. R.

Hocking Valley R. R.

Toledo and Ohio Central R. R.

SMITH'S COAL DOCK

12 POCKETS.

PLATFORM.

LOW DOCK.

Operated by **STANLEY B. SMITH & CO.,**

Detroit River,

Detroit, Mich.

MARINE SUPPLY COMPANY. — STORE AND ICE HOUSE ON DOCK.

McNAB & HARLIN MFG. CO.

MANUFACTURERS OF
HIGH PRESSURE VALVES,

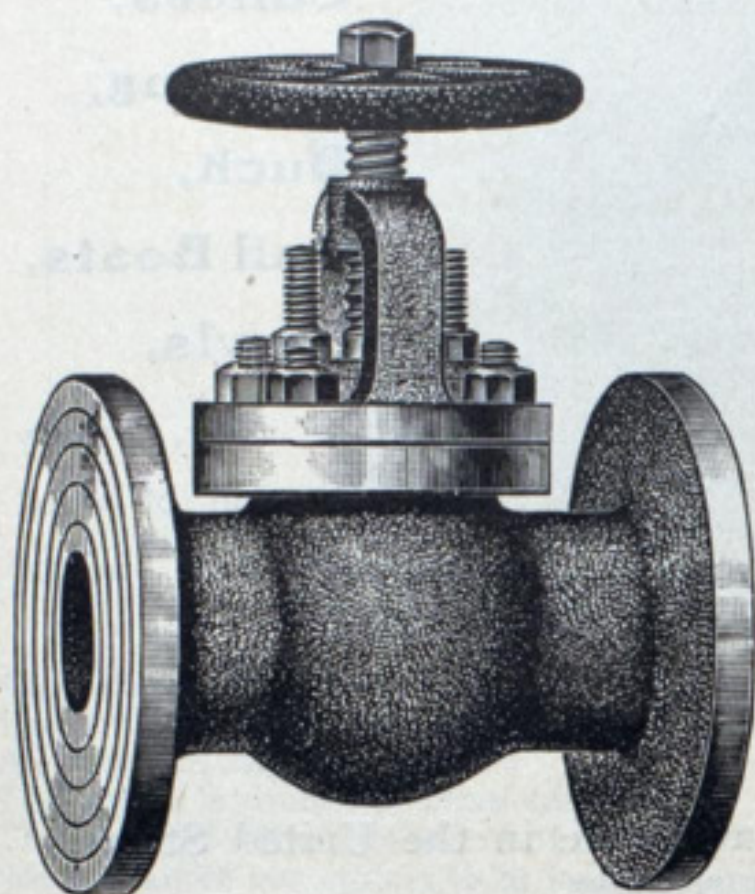
**ENGINE AND BOILER
TRIMMINGS,**

AND

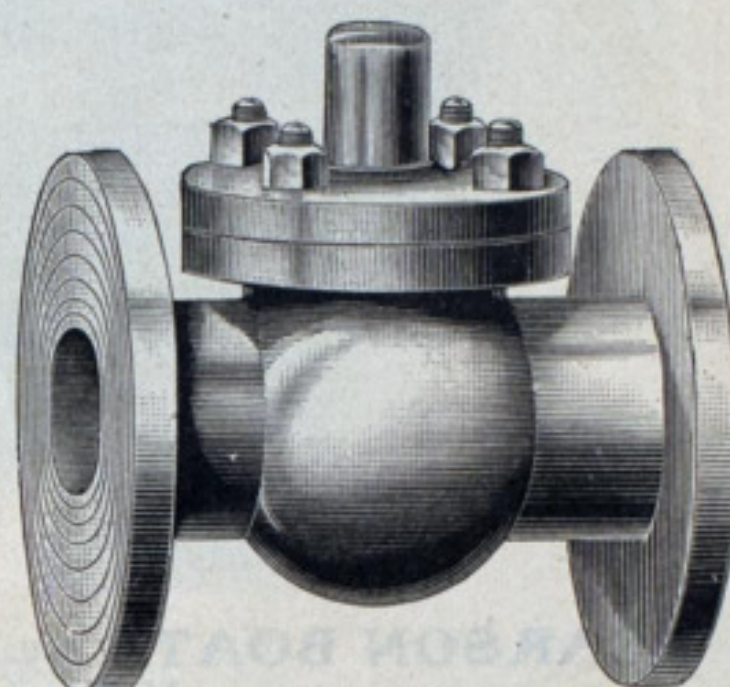
All Brass and Iron Goods

FOR

**STEAM,
GAS and
WATER**



FACTORY:
PATERSON, N. J.



OFFICE AND SALESROOM:
50-52-54-56 John St.,
NEW YORK.

Steel Castings

from 100 to 75,000 lbs.

Otis Steel

Ship Plates

Flange Plates

Tank Plates

Steel Car Axles

Forgings of all kinds

"Otis" Fire Box Plates a Specialty.

Head Office and Works, CLEVELAND, OHIO.

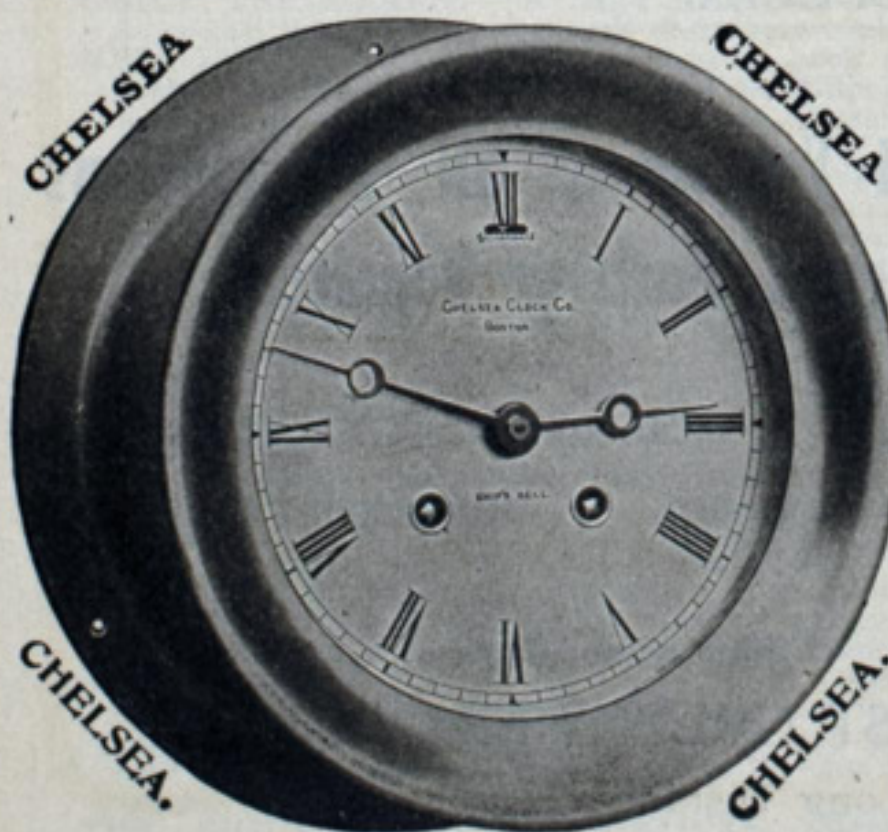
New York: Thorpe, Platt & Co., 97 Cedar St.

Montreal: Homer Taylor, 183 St. James St.

AGENCIES.

St. Louis: C. A. Thompson, 516 N. Third St.

San Francisco: John Woodlock, 154-156 First St.



The Justly Celebrated "CHELSEA"

(Patented in the United States and Great Britain)

BEST IN THE WORLD

**STRIKING
SHIP'S BELL
CLOCK**

THE clock for use in Pilot Houses, Cabins and EACH stateroom on YACHTS, fine passenger STEAMSHIPS, etc., etc.

8-Day, Jewelled Escapements. Excellent Timekeepers.
Solid Cast Brass Screw Bezel Cases; Fog and Dust Proof.

Size of Clock (Dial) 4 1/2 in. 6 in. 8 1/2 in. 10 in. 12 in.

PRICE (in Screw Bezel Case), \$42 \$47 \$55 \$60 \$65

" (in Hinged Bezel Case), 45 50 55 60 65

Hinged Bezel Cases recommended for 8 1/2, 10 and 12 in. sizes, and for all sizes to be used Permanently with bases. Special base, for using clock on Desks, Mantels, etc., in Clubs, Offices, Libraries and Sleeping Rooms, made of Mahogany and Polished Brass, the latter finished like clock case, costs \$9 to \$33 extra, according to size of clock. Cases are finished Polished Brass, Black Oxide or Nickel as may be ordered. Also High-Grade Engine Room and Non-Magnetic Lever Clocks and Office pendulum Clocks; and

HIGH-GRADE AUTO CLOCK (Trade Mark) in DUPLEX (patent applied for) Solid Cast Brass

Screw Bezel Cases, the most thoroughly WATER PROOF CASE on the market. Two sizes, 2 1/4 in.

8-DAY (dial) \$27, 3 1/4 in. (dial) \$33. For MOTOR CARS AND MOTOR BOATS.

ON SALE by Leading Dealers in Best Clocks, Jewelry, Nautical Instruments, and Yacht-

ing Supplies, etc., etc. YOU want the BEST? Ask for the "CHELSEA" CLOCK.

CHELSEA CLOCK CO., Dept. D, 16 State St., Boston, Mass., U. S. A.

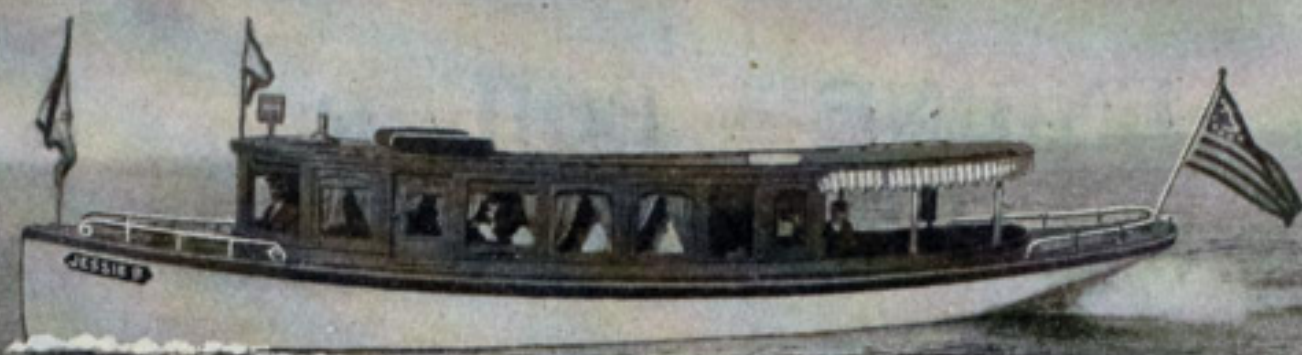
Order for Export through responsible American Shipping and Commission Houses.

Pearson Launches Fantail, Round Square and Torpedo Sterns

Over 100 now in **Stock**, ready for your selection. Descriptive list sent free. We make

**Launches,
Row Boats,
Canoes,
Hunting,
Duck,
Sail Boats,
Yawls,**

in fact, every description of wood boats. Write us of your needs.



PEARSON BOATS are conceded to be the **best designed** boats made in the United States. Material and workmanship perfect. Catalogue on request.

PEARSON BOAT CONSTRUCTION CO., Duluth, Minnesota.

Manufacturers of Gasoline Engines, Jump Spark, Mechanical Spark.

WE BUILD

The Only Naphtha Launch,
Gasolene Launches,
Auto Boats,
Alco-Vapor Launches,
Steam and Sail Yachts.

Send ten cent stamp for catalogue of Naphtha, Gasolene or Alco-Vapor Launches.

Gas Engine & Power Co.

AND

Chas. L. Seabury & Co.

Consolidated.

Morris Heights,

NEW YORK CITY.

DOWN TOWN OFFICE, 11 BROADWAY.
CHICAGO OFFICE, 1409 MICHIGAN AVE.

FREDERIC S. NOCK,

Naval
Architect
and Builder

THE DESIGNING AND BUILDING
OF HIGH SPEED POWER CRAFT
A SPECIALTY.

**Yachts and Vessels of all Descriptions
Designed, Built or Repaired.**

Marine Railway, Storage, Yacht Supplies,
Marine Insurance, Brokerage, Etc.

Office and Works
EAST GREENWICH, R. I.
Long Distance Telephone.

**A BUSINESS PAPER
READ BY BUSINESS MEN
AS A MATTER OF BUSINESS.**

THE IRON TRADE REVIEW

Contains each week a digest of the market conditions in iron and steel lines, quotations that are unexcelled for accuracy, the latest ideas in the equipment of plants, new methods of shop management, descriptions of money saving machines, articles on cost-keeping and many other features of value for the man who decides—the man who does the buying.

The largest concerns in the country pay for numbers of copies to be sent to the heads of departments of all their plants that they may be benefited by the features appearing each week.

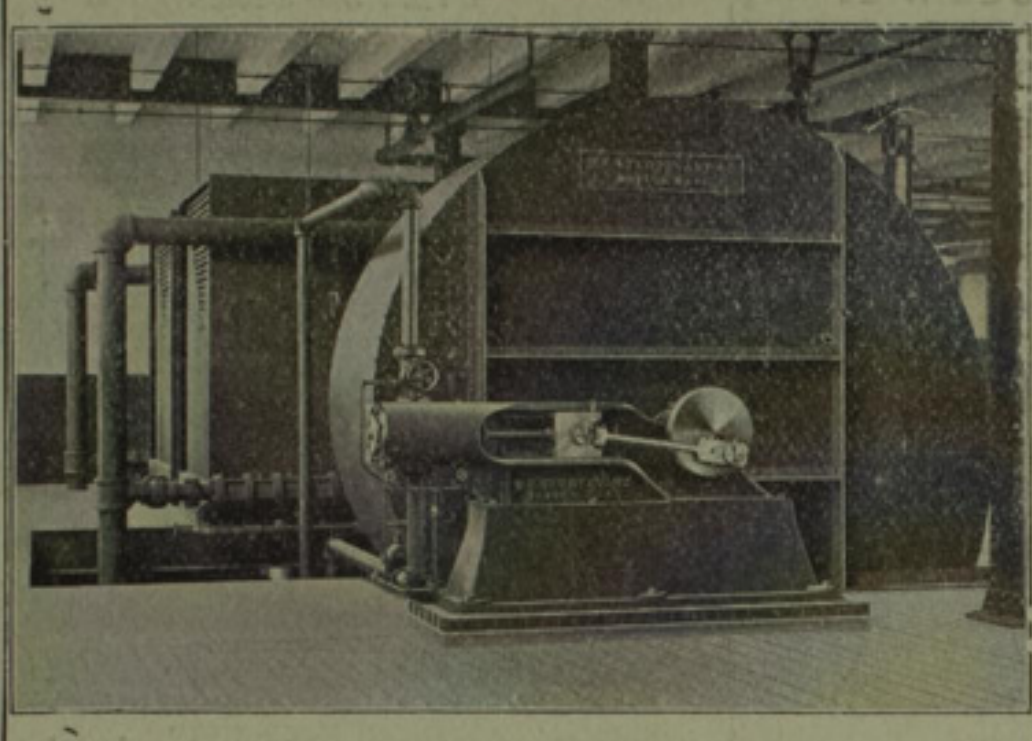
Valuable alike to reader and advertiser because contents and circulation are of such a high quality.

Published by

THE IRON AND STEEL PRESS CO.

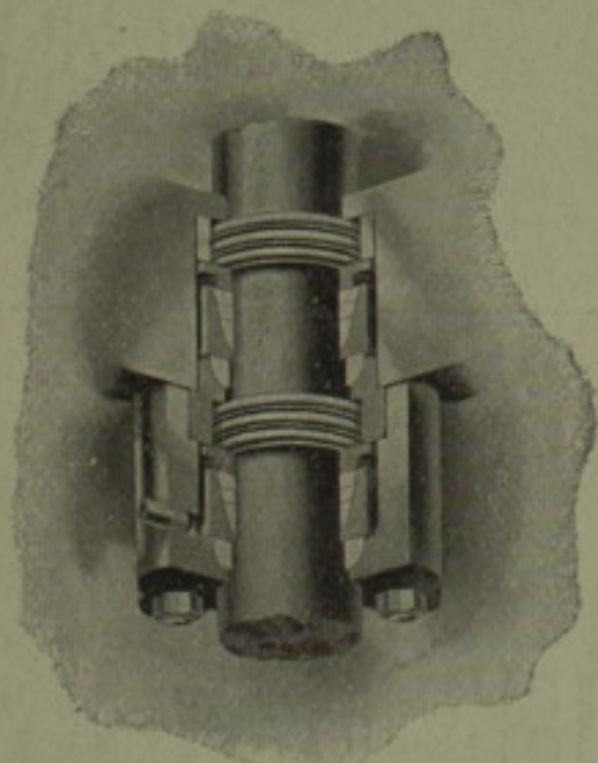
CLEVELAND, O.

Publishers of **THE FOUNDRY
THE PATTERNMAKER
THE IRON TRADE REVIEW**

STURTEVANT

Fans ▯ Blowers ▯ Engines ▯ Motors
 Generating Sets ▯ Exhaust Heads
 Mechanical Draft Apparatus ▯ Forges
 Heating, Ventilating & Drying Apparatus
 Industrial Equipments ▯ ▯ ▯ ▯

B. F. STURTEVANT CO.
 BOSTON, MASSACHUSETTS
 New York. Philadelphia. Chicago. London.



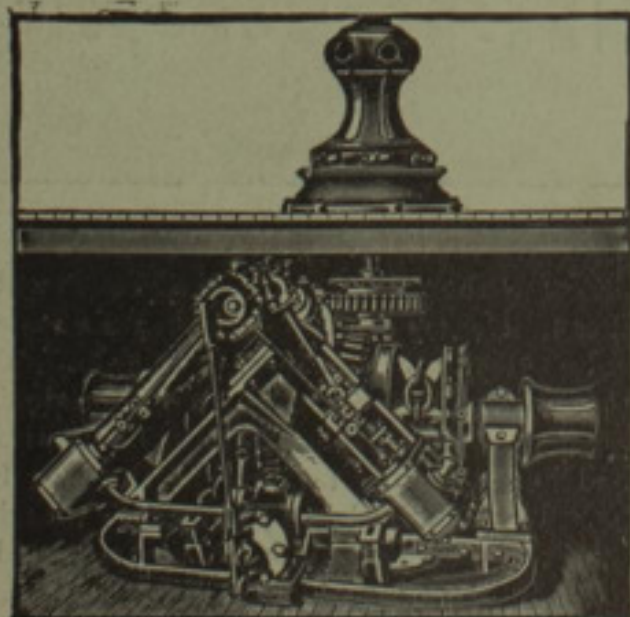
Class No. 1 Packing.

United States Metallic Packing Co.

427 NORTH 13TH ST.
 PHILADELPHIA, PENN.

SEND FOR CATALOG

CHICAGO
 509 Great Northern Building

WINDLASSES AND CAPSTANS

THE "HYDE" STEAM CAPSTAN WINDLASS.
HYDE WINDLASS COMPANY, BATH MAINE.

The Hyde Steam and Power Windlasses and Capstans are the best in the market.

They have been selected for most of the vessels now building for the Navy Department, Revenue Marine, Light-house Board and United States Coast Survey

They are being furnished for the majority of the highest class Steam Ships, Merchant Vessels and Yachts now building.

Engineers, Founders and Machinists

Heavy Forgings
 Engine Repairs
 Propeller Wheels (Solid and Sectional)
 Aetna Grate Bars
 Timberheads, Chocks, etc.

THE MACBETH IRON COMPANY.

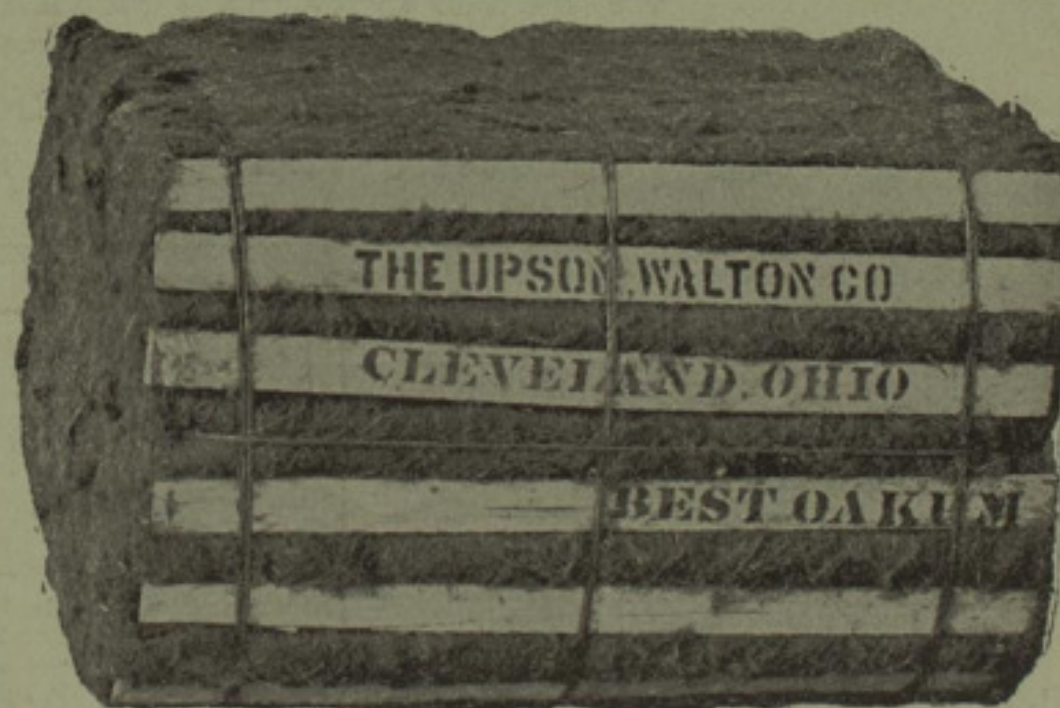
57 WEST CENTER ST.
 CLEVELAND - OHIO.

JAMES PLAYFAIR, { Pres't and Gen. Mgr
 D. L. WHITE, Vice President
 J. W. BENSON, Secretary and Treasurer.

**MIDLAND TOWING and
WRECKING CO., Ltd.**

MIDLAND, ONT., CANADA.

FIRST-CLASS TUGS FOR WRECKING,
 RAFT TOWING, Etc., STEAM PUMPS,
 DIVERS, JACKS, HAWSERS, LIGHTERS.

**LIFE PRESERVERS-BUOYS.**

Aome. Solid Cork. Granulated Cork. Each Preserver stamped by U. S. Inspector guaranteeing proper buoyancy. Cork Filled Yacht Fenders. Cork Mooring Buoys. Material and Finish Guaranteed. Orders filled promptly.

ARMSTRONG CORK COMPANY.

Boston. New York. Philadelphia. Pittsburg. Chicago.
 St. Louis. Baltimore.

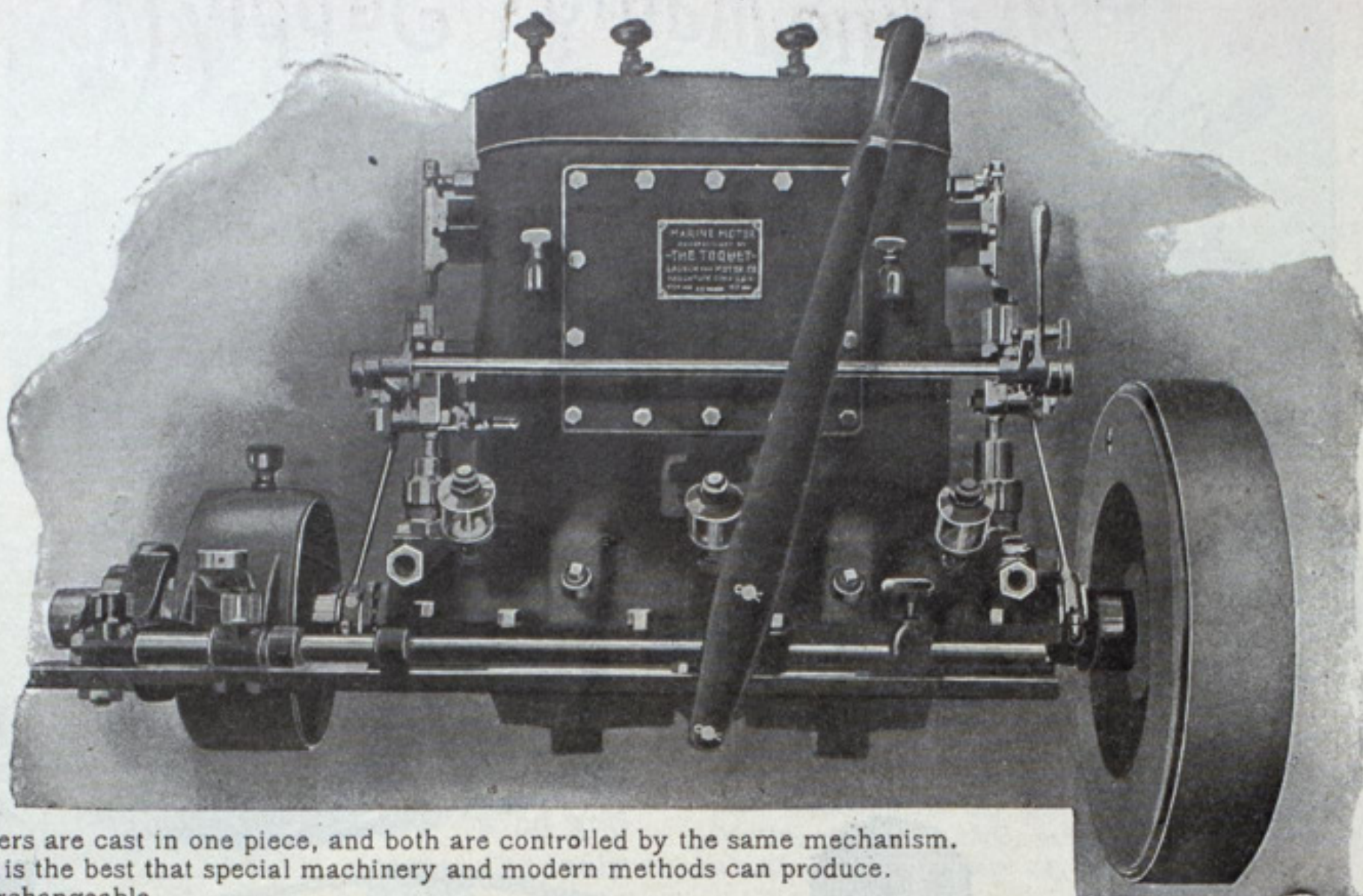
Howard H. Baker & Co.,

**SHIP CHANDLERS
 and SAIL MAKERS**

18 to 26 Terrace,

BUFFALO, N. Y.

We Build Two-Cycle Engines in sizes from 2 to 8 Horse-Power.



All double cylinders are cast in one piece, and both are controlled by the same mechanism.
The construction is the best that special machinery and modern methods can produce.
All parts are interchangeable.
The igniter is simple, positive and durable.
The bearings of our motor are of ample size to insure cool running and are lubricated automatically.
We guarantee our motors to be manufactured of the best material, and the workmanship to be first-class.

FOR CATALOGUE AND PRICES, ADDRESS

THE TOQUET MOTOR COMPANY = Saugatuck, Conn.

EIGHTEENTH ENLARGED EDITION: OVER 1,300 PAGES.

The Shipping World Year Book,

1904.

EDITED BY MAJOR JONES AND A STAFF OF EXPERTS.

THE WORK EMBRACES:

- I.—Customs Tariffs of All Nations.
- II.—A Port Directory of the World.
- III.—Board of Trade Rules and Regulations.
- IV.—Load Line Tables, Sailing Rules, Lights, Signals.
- V.—Digest of Shipping Laws. And much other Useful Information.

A LARGE MAP OF THE WORLD, specially designed by J. G. Bartholomew, F. R. G. S., F. R. S. E., is supplied in a pocket in the cover. Introduced by a RETROSPECTIVE VIEW of 1903.

Crown 8vo., cloth. Price: In the United Kingdom, 5s; foreign countries, 6s. Post free.

THE TIMES.—“The information given is wide in scope, and varied in matter, dealing with almost every subject of interest connected with trade, commerce, and navigation. About one-third of the volume is devoted to the tariffs of all nations, which are given in full.

DAILY TELEGRAPH.—“A more comprehensive handbook in its special line for the merchant's desk there could scarcely be.”

NEW YORK TRIBUNE.—“This compact book of upwards of twelve hundred pages, published by ‘The Shipping World,’ of London, contains an immense amount of information of value to the mariner and shipper.

PALL MALL GAZETTE.—“The Shipping World Year Book’ is sweet seventeen, and would be very much missed if it failed to put in a regular appearance, but fortunately there is no danger of that. The comprehensive retrospect of shipping affairs deserves special attention, and will repay careful study.”

GLASGOW HERALD.—“The book more than ever commands the confidence of those large mercantile classes who have been accustomed to consult its pages for world-wide information, and always with success.”

NEWCASTLE CHRONICLE.—“Those who refer to it will find all matters appertaining to the business of the shipowner brought right up to date.”

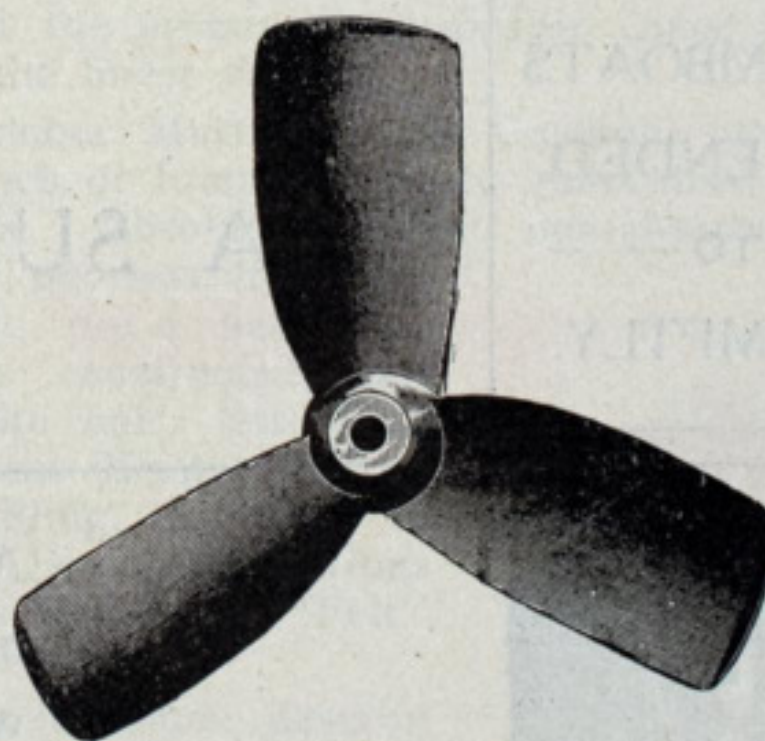
LIVERPOOL JOURNAL OF COMMERCE.—“Filled from cover to cover with information absolutely indispensable to all engaged in the over-sea commerce of this country.”

TIMBER.—“There is not another book of its size in the world which contains so much information worth having.”

SOUTH WALES DAILY NEWS.—“Major Jones, the capable editor, has anticipated the public attention now being devoted to tariffs, and those of all nations and of the Colonies have been included and revised up to the last hour of publication.”

THE SHIPPING WORLD OFFICES, Effingham House, Arundel-street, Strand, London, W. C.

The Strothman Patent Propeller Wheel.



Patented Dec. 10, 1901, April 29, 1902.

A new principle in Ship Propulsion.

Have gained $2\frac{1}{2}$ miles per hour over old style wheels.

Gains in Speed, Backing and Towing Power; also in Quick Starting and Stopping; all with a saving in fuel over other screw blade wheels.

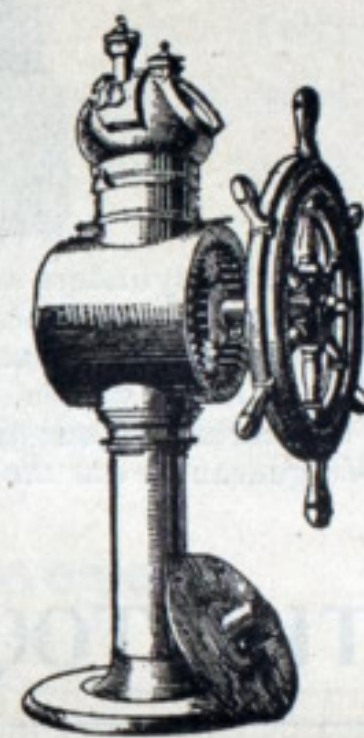
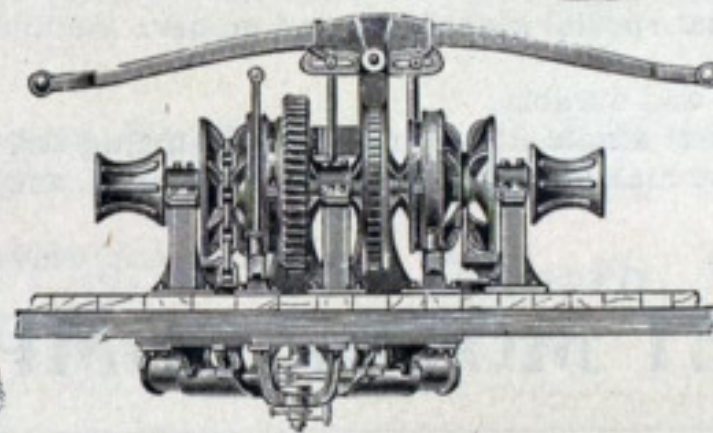
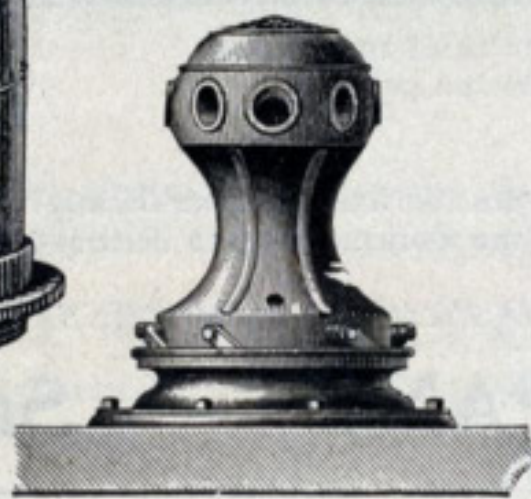
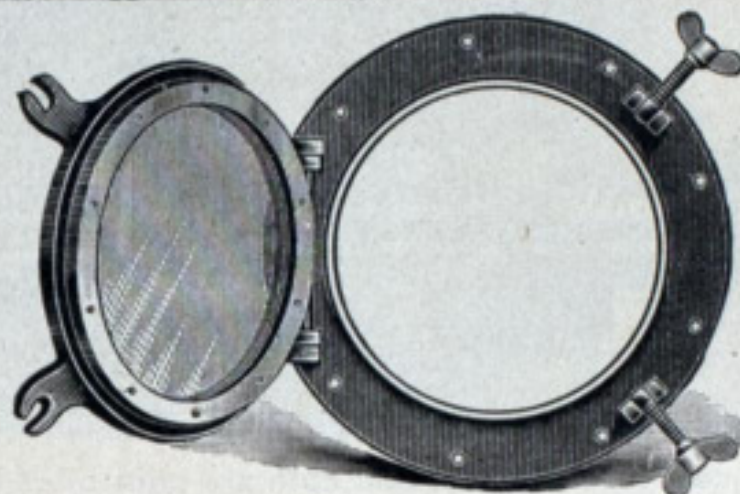
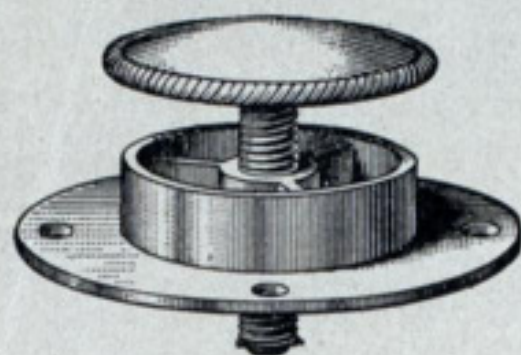
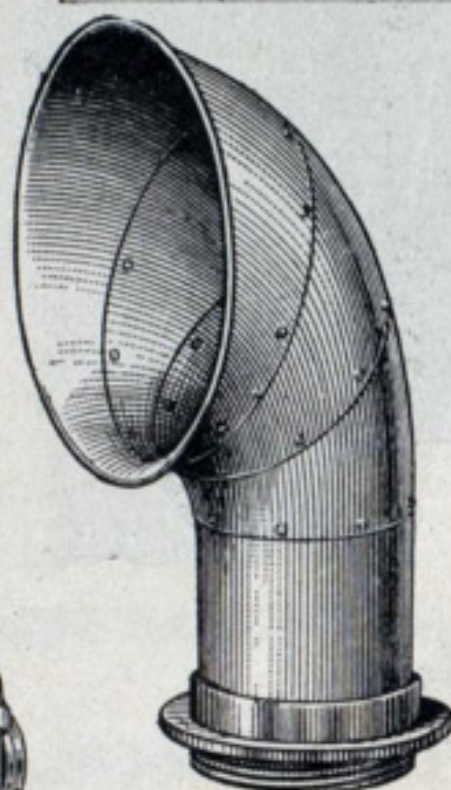
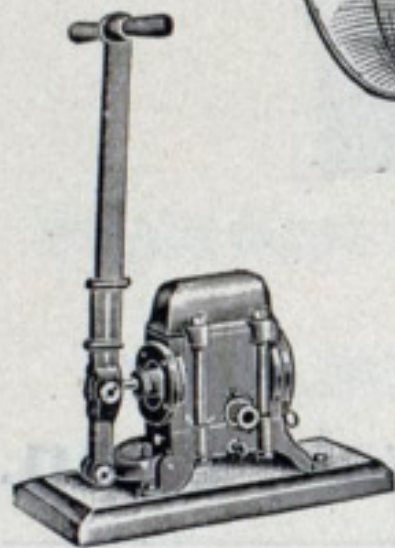
Can furnish best testimonials.

Canadian and American Patents FOR SALE at moderate price.

Strothman Iron Company,
Superior, Wis.



The Marine Manfg and Supply Co.
 157 AND 158 SOUTH STREET,
 NEW YORK.
 SHIP MACHINERY, YACHT FIXTURES,
 STEAMSHIP ENGINEERS & CONTRACTORS SUPPLIES.
 MARINE AND HEAVY
 HARDWARE.
 ANCHORS AND CHAINS, CORDAGE,
 WIRE ROPE, FLAGS, ETC.
 OAKUM AND NAVAL STORES.

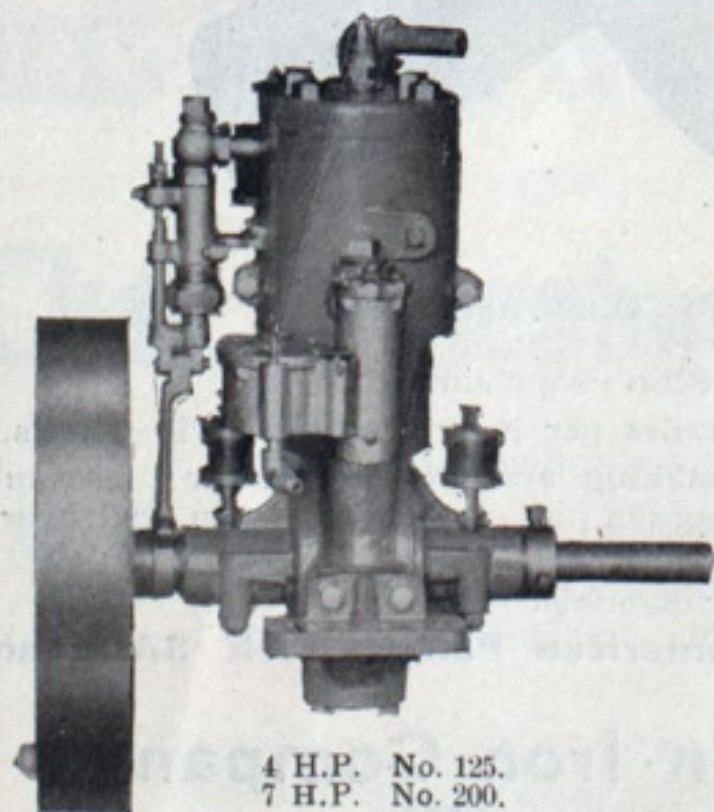


ALL KINDS
 OF REPAIR
 WORK FOR
 STEAMBOATS
 ATTENDED
 ———TO———
 PROMPTLY.

Marine Iron Co.,

DULUTH, MINN.

A SUPPLY BOAT AVAILABLE DAY
 AND NIGHT.



4 H.P. No. 125.
 7 H.P. No. 200.

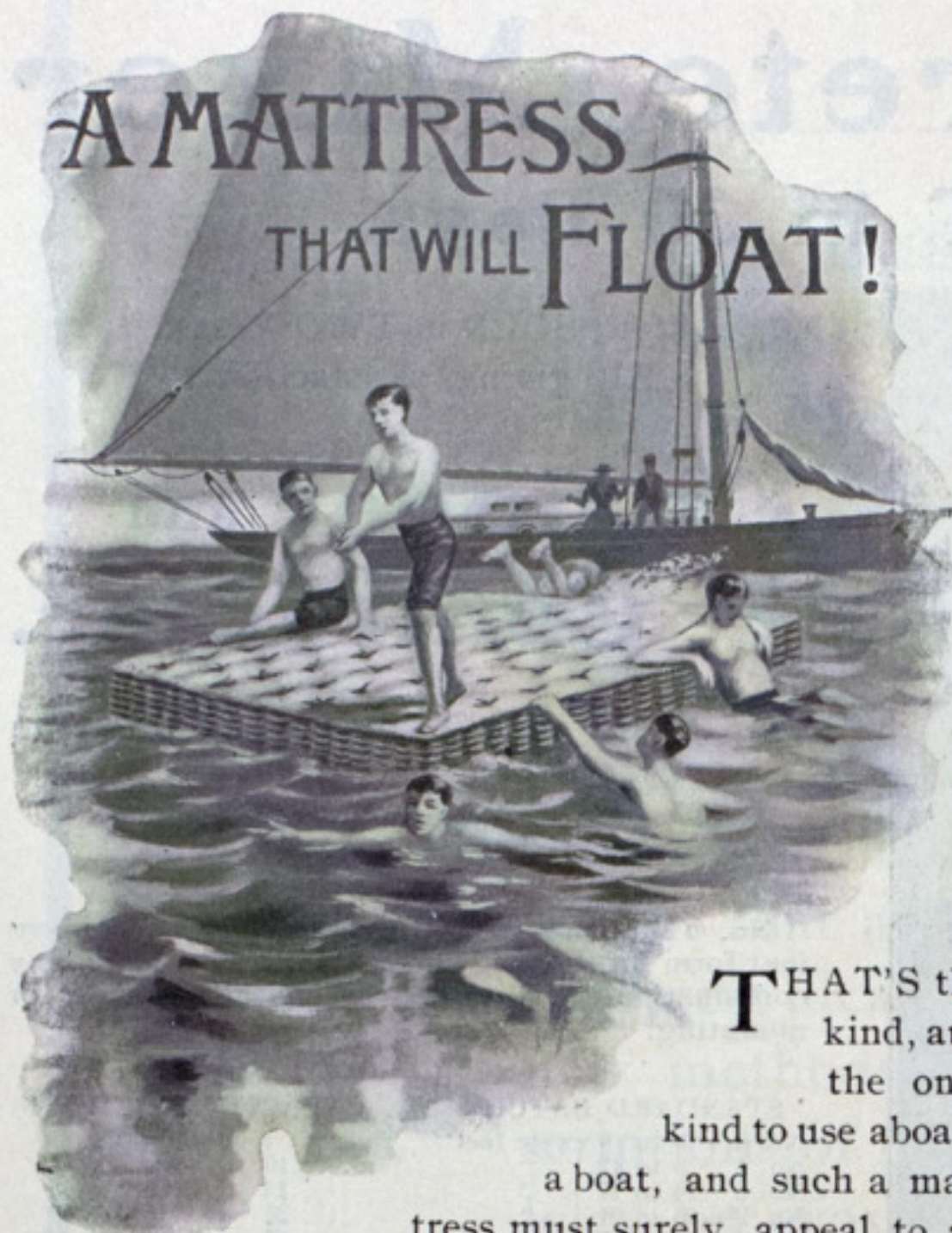
Free Catalogue.

All marine motors have some merit, some have more than others. We believe ourselves well within the limit when saying none show more efficiency for their size and weight considering power developed, or for simplicity of construction.

CUSHMAN MOTOR CO.,

LINCOLN, NEB.

A MATTRESS THAT WILL FLOAT!



THAT'S the kind, and the only kind to use aboard a boat, and such a mattress must surely appeal to all yachtsmen—not that he buys mattresses for this purpose, but because such a mattress is badly needed afloat, one that can be depended upon as non-absorbent and not affected by moisture, and that will not become sodden, dank and uncomfortable like all others.

C. OLIVER ISELIN, NEW ROCHELLE, N. Y.,

MESSRS. OSTERMOOR & CO.

DEAR SIR:—The Ostermoor Mattresses, etc., you furnished for my Yacht "Titania," in 1887, *give entire satisfaction*, and should I build another yacht *I would certainly give you another order*.

Truly yours,

C. OLIVER ISELIN.

No matter how much is paid for rich and elegant coverings, the greatest complaint of yacht owners—no matter how great the care and attention given—is dampness, odor, and vermin, which soon robs the cushions and mattresses of their freshness, making them things to be avoided rather than sought with any sense of comfort or delight—remaking becomes necessary, entailing expense and annoyance, which must be repeated again and again to keep a boat fairly clean and comfortable.

DAVID DOWS & CO., NEW YORK CITY.

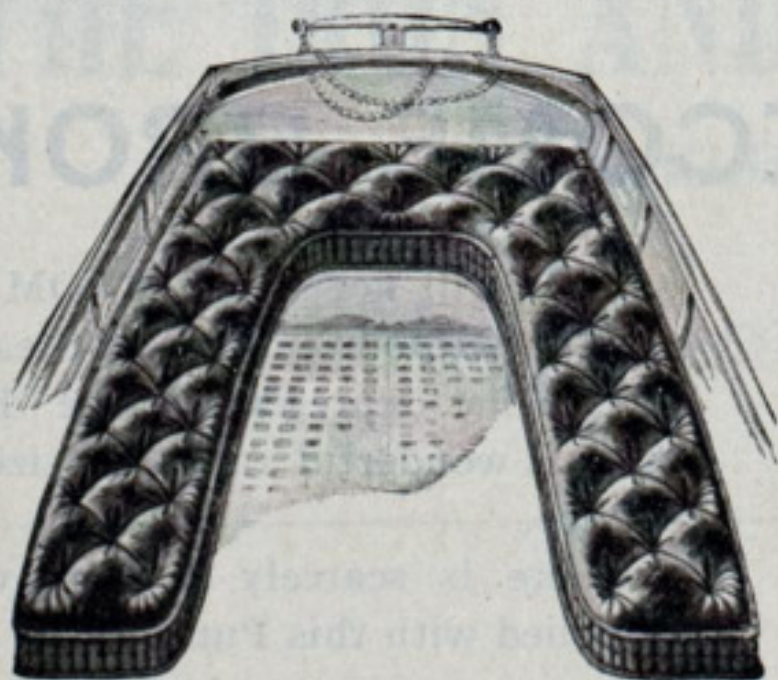
MESSRS. OSTERMOOR & CO.,

February 15, 1902.

GENTLEMEN:—It gives me much pleasure to be able to say that the Ostermoor Cushions and Mattresses you made for my boat are *still in use and in admirable state of preservation*, and in my opinion fully justify all you said concerning them at the time of the purchase, *seventeen years ago*.

Yours truly,

A. E. ORR.



All this can be avoided by the use of the Ostermoor Mattresses and Cushions, which are so non-absorbent they will float, therefore rated as Auxiliary Life Preservers by the U. S. Steamboat Inspection. They are also the most comfortable mattresses and cushions made, softer at all times than the best of hair, always sweet, pure and clean under all sorts of conditions, however unfavorable, and remain so without costing a cent for repairs of any kind for years to come.

CARY SMITH & FERRIS, NEW YORK,
NAVAL ARCHITECTS AND YACHT BROKERS,
90 Wall Street,

February 6, 1904.

MESSRS OSTERMOOR & CO.

DEAR SIR:—

You have very satisfactorily fitted out the yachts and steamers of my design with Ostermoor Cushions and Mattresses since 1880, and I have yet to hear any complaint about them after these 24 years.

Very truly yours,

A. CARY SMITH.



The expensive remaking so necessary with hair is never required, the first cost of the Ostermoor is less than hair, and unlike hair, the last and only cost; they are practically un-wear-out-able—

adopted and used exclusively in the U. S. Navy, nearly all the prominent Steamship Lines and over $\frac{2}{3}$ of all the finest yachts.

Ostermoor Mattresses and Cushions never mat, pack, bunch or lump—they are guaranteed to keep their shape. Absolutely perfect, non-absorbent, vermin proof, odorless, hygienic, wholesome and healthful. They are constructed, not stuffed like hair, but filled with Patent Elastic Felt, a sheeted filling, hand-laid in covering. Beware of spurious imitations, they are not "Felt" if not Ostermoor.

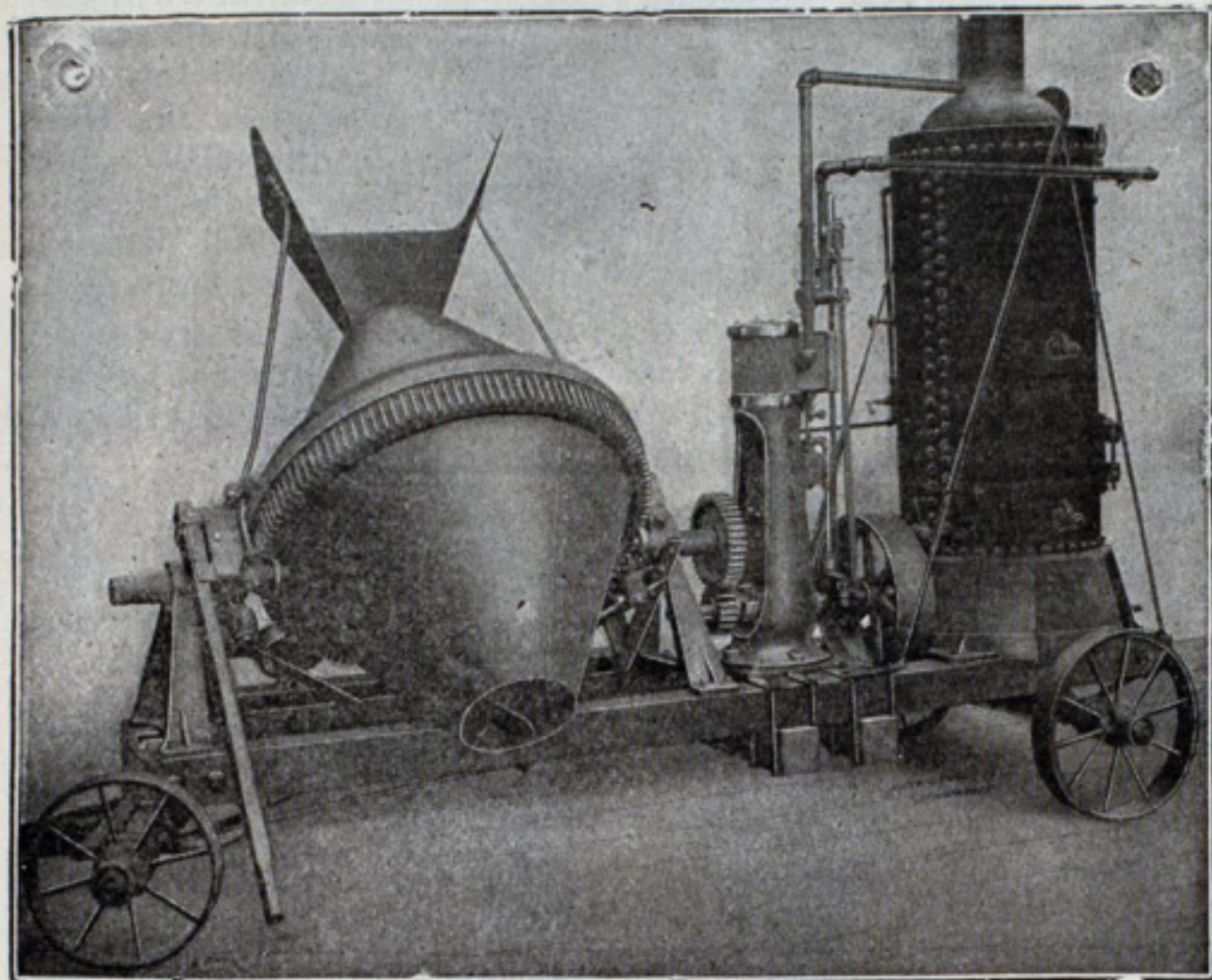
A very handsome descriptive 128 page catalogue profusely illustrated describing both cushions and mattresses and their unusual merits, manner of making, etc., is yours for the asking.

Call or address OSTERMOOR & CO., 114 Elizabeth St., N. Y. Show Room extends through entire block to 132 Bowery, just north of Grand St.



Smith Concrete Mixer

Saves ITS COST in 30 Days.



500 SOLD in TWO Years.
All giving satisfaction to

Engineer and Contractor.

Perfect mix! Perfect mechanically!

Write us for Catalogs and investigate carefully.
We will help you.

No. 2 on truck with Engine and Boiler, convenient form for moving about ship yards also in any combination as to power or without power or mounting.

STANDARD BATCH		CAPACITY PER HOUR.	
No. 0	5 to 6 cubic feet	.....	5 cubic yards
No. 1	9 to 12 "	.....	10 "
No. 2	13 to 17 "	.....	15 "
No. 2½	16 to 21 "	.....	20 "
No. 3	28 to 35 "	.....	35 "

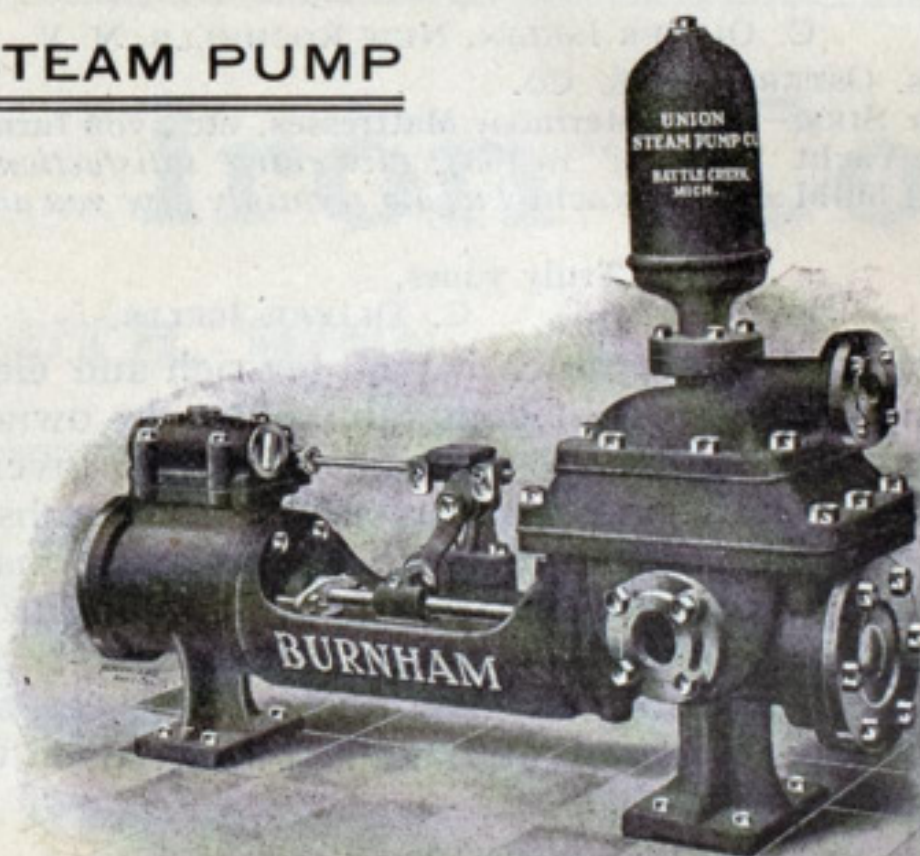
Contractors' Supply & Equipment Co., 232 Fifth Ave., Chicago.
509-511 West Fifth St., Kansas City, Mo.

THE GREAT BURNHAM STEAM PUMP

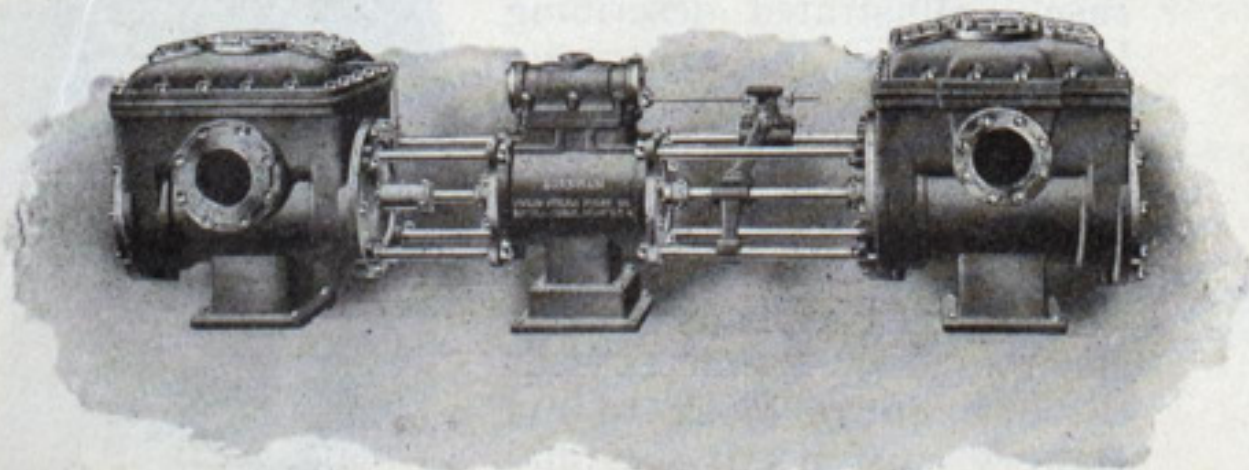
MANUFACTURED BY THE

UNION STEAM PUMP CO.,
BATTLE CREEK, MICH.

Is the ONLY Steam Pump having a Flat Faced Valve with a minimum of clearance in the Steam Cylinder WHICH WILL NOT STRIKE THE HEADS under a Full Head of Steam when the Pump is in Labor and the



SUCTION MAY BECOME BROKEN



or that will not injure FROM LOAD TO NO LOAD, without change of Steam Throttle.

The list representing the Burnham Pump, offers a wonderful range of sizes and variety of service.

There is scarcely a Want which cannot be Supplied with this Pump—and

ONCE USED—ALWAYS USED.

GENERAL ELECTRIC COMPANY'S

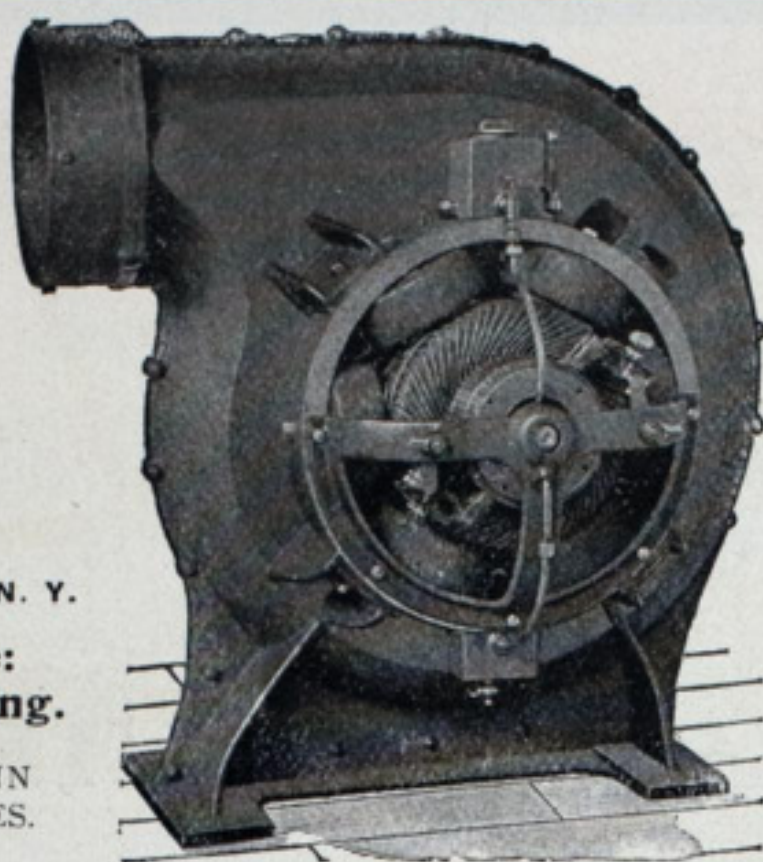
Electric Blowers
& Exhaust Fans,

*May be run with less
attention than any
other motive power.*

GENERAL OFFICES:
SCHENECTADY, N. Y.

Cleveland Office:
Citizens Building.

SALES OFFICES IN
ALL LARGE CITIES.



ASHTON

Cam Lever Pop Safety Valves
and Non-Corrosive steam gauges
give highest efficiency and durability.
Specify them and get the best.



The Ashton Valve Co., Boston, New York
and Chicago, U. S. A.

All of the latest and largest LAKE STEAMSHIPS are com-
pletely equipped with **BLAKE**

DUPLEX AND SIMPLEX SPECIAL MARINE PUMPS.
New Marine Catalog ready about July 1st.

Geo. F. Blake Mfg. Co.

114 Liberty St., :: :: :: NEW YORK CITY.

JENKINS BROS. PUMP VALVES



are made from various compounds,
each of which is best adapted for a
particular kind of work. Our many
years of experience has enabled us to
so perfect these compounds and the
process of manufacture that we can
confidently recommend our pump val-
ves as the very best obtainable.

They are guaranteed, and unless
used in service for which they are not intended we will always
replace such as fail to give satisfactory or reasonable service.

All genuine bear our Trade Mark as shown in the cut.

JENKINS BROS.,

New York. Boston. Chicago. Philadelphia. London.

THE
BOURNE-FULLER CO.
IRON, STEEL,
PIG IRON,
COKE.

Cleveland, Ohio

Bessemer and Open Hearth
Plates, Bars, Shapes, etc., for
Bridges, Boilers, Tanks, etc.,
Closest mill prices named.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (SEPTEMBER, 1903)

On Board Sea-going Vessels, NOT INCLUDING New In-
stallations Building or Erecting.

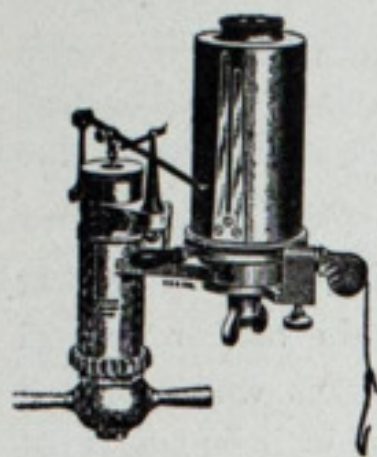
French Navy	-	-	-	-	-	-	-	355,560 H. P.
English Royal Navy	-	-	-	-	-	-	-	929,300 "
Russian Imperial Navy	-	-	-	-	-	-	-	227,500 "
Japanese Imperial Navy	-	-	-	-	-	-	-	122,700 "
Austrian Imperial Navy	-	-	-	-	-	-	-	56,700 "
Italian Royal Navy	-	-	-	-	-	-	-	13,500 "
Chilian Navy	-	-	-	-	-	-	-	26,500 "
Argentine Navy	-	-	-	-	-	-	-	13,000 "
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	Steamships
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	18,500 "
Total Horse Power of Boilers in Use	-	-	-	-	-	-	-	1,850,860

Société Anonyme des Etablissements Delaunay Belleville

CAPITAL: 6,000,000 FRANCS

Works and Dock Yards of the Ermitage at Saint-Denis (Seine), France.

Telegraphic Address: Belleville, Saint-Denis-Sur-Seine



SEND AT
ONCE FOR
CATALOG

AMERICAN

THOMPSON IMPROVED INDICA-
TOR with NEW DETENT MOTION.

DO NOT let this IMPROVEMENT
ESCAPE YOUR ATTENTION.

INDICATORS THAT INDICATE
GAUGES THAT GAUGE
POPS THAT POP

AMERICAN STEAM GAUGE & VALVE MFG. CO.

NEW YORK.

BOSTON.

CHICAGO.

LUCK
WITH

EACH
CAN

BERTRAM'S

POLISH

For TWENTY Years the
Standard of Excellence.

Can be brightened next day by merely
rubbing with DRY CLOTH. Every
can contains lucky coin. Will bring
LUCK IN EACH RACE.

Used on all CUP DEFENDERS

THE MARINE POLISH OF THE WORLD.
AGENTS WANTED IN ALL LARGE CITIES.

A Sample of Bertram's Oil Polish
mailed FREE OF CHARGE on request.

BERTRAM'S OIL POLISH CO.,
BOSTON, MASS.



IN A RECENT TEST

MADE BY UNCLE SAM,

where both Foreign and Domestic
Anchors were considered, the . . .

Baldt Stockless Anchor
was the only one approved

For Catalogue and particulars address

The Baldt Anchor Co., Chester, Pa.

AIDS TO NAVIGATION

are of vital importance to vessel interests.

SCHERZER ROLLING LIFT BRIDGES

aid navigation and meet with the approval of all vessel
interests, because of the wide and unobstructed channel
provided for navigation, enabling vessels to pass easily and
rapidly through the draw.

The SCHERZER ROLLING LIFT BRIDGE Co.,

Main Offices: 1616 Monadnock Block,

CHICAGO, U. S. A.

GENUINE ASBESTO-METALLIC PACKING



Very generally known,
used and recommended
by Lake Engineers.

Manufactured by
AMERICAN STEAM
PACKING CO.,
Boston.

"FOREST CITY" MARINE PAINT

A Paint Made Expressly
For This Purpose : : :

The Forest City Paint & Varnish Co.,
CLEVELAND, OHIO.

Hand Book of ADMIRALTY LAW
By Robt. M. Hughes.

\$3.75.

Marine Review,

Cleveland, O.

Latest Patent Anchors THE National and International.

APPROVED BY LLOYDS

Manufactured by
L. M. BOWERS & CO.,
Binghamton, N. Y.

Furnished to
Lake Trade by

The Upson-Walton Co.
CLEVELAND



CATALOGUE ON APPLICATION.

Search Lights and Projectors.

From 8 in. to 30 in. Diam.

ANY METAL

For RIVER, LAKE and OCEAN Service.

CHAS. J. BOGUE,

223 Center Street

NEW YORK.

Write for Bulletin No. 2.

Books on Naval Architecture, Ship Yard Practice, Seamanship, Etc.

AMERICAN PRACTICAL NAVIGATOR—Nathaniel Bowditch. 1903 edition. \$2.25.

DATA BOOK—Naval architects and engineers' data book. By T. H. Watson. A reliable and simple means of recording valuable data, etc., of vessels and engines. Size of book, 8 1/4 in. by 5 in., cloth. \$1.50.

ELECTROMAGNETIC PHENOMENA AND THE DEVIATIONS OF THE COMPASS—Com. T. A. Lyons. \$6.

ELEMENTARY SEAMANSHIP—by Barker. New and enlarged edition. \$2.50.

ELEMENTS OF NAVIGATION—Henderson. \$1.

HAND BOOK OF ADMIRALTY LAW—Robt. M. Hughes. \$3.75.

HINTS ON LEGAL DUTIES OF SHIPMASTERS—B. W. Ginsburg. \$1.75.

HOW TO BUILD A LAUNCH FROM PLANS, with general instructions for the care and running of gas engines. Chas. G. Davis. \$1.50.

ILLUSTRATED NAUTICAL ENCYCLOPEDIA—Howard Patterson. \$3.

INTERNATIONAL SIGNAL CODE—Bureau of Navigation. New edition. \$3.

KNOW YOUR OWN SHIP—Thos. Walton. \$2.50.

MANUAL OF ALGEBRA—R. C. Buck. For the use, more especially, of young sailors and officers in the merchant navy; numerous examples and exercises. \$1.50.

MARINE INSURANCE—W. Gow. \$1.50.

MARINER'S COMPASS IN AN IRON SHIP: How to keep it efficient and use it intelligently—J. W. Dixon. \$1.

MODEL ENGINES AND SMALL BOATS—N. M. Hopkins. New methods of engine and boiler making; ship design and construction; fifty illustrations. \$1.25.

MODERN SEAMANSHIP—Lieut. Com. Austin M. Knight, U. S. N. Adopted as the text book of the United States Naval Academy. \$6.

MODERN PRACTICE OF SHIP BUILDING IN IRON AND STEEL—Samuel J. P. Thearle. Two volumes. Second edition, revised and enlarged. \$5.25.

NAVAL ARCHITECTURE: A treatise on laying off and building wood, iron and composite ships.—Samuel J. P. Thearle. In two volumes. \$3.

NAVAL ARCHITECTURE: A manual on laying off iron and steel vessels—Thos. H. Watson. Valuable for naval architects as well as beginners in ship yards. \$5.

NAVAL ARCHITECTURE—Sir W. H. White. New edition. 750 pages. \$9.

NAVAL ARCHITECTS AND SHIPBUILDERS' POCKET BOOK—Clement Mackrow. Formulae, rules and tables, and marine engineers' and surveyors' Handy Book of Reference. Eighth edition, revised and enlarged. \$5.

NAVIGATION SIMPLIFIED—C. E. McArthur. Containing all problems required for U. S. Local Inspector's Examination of Masters and Mates of seagoing vessels. \$1.

POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.

PRACTICAL COMPASS ADJUSTMENT on Iron, Composite and Wooden Vessels. Illustrated.—Capt. W. J. Smith. \$2.

PRACTICAL INFORMATION ON THE DEVIATION OF THE COMPASS, for the use of Masters and Mates of Iron Ships—J. T. Towson. \$2.

PRACTICAL SEAMANSHIP FOR USE IN THE MERCHANT SERVICE: Including all ordinary subjects; also Steam Seamanship, Wreck Lifting, Avoiding Collision, Wire Splicing, Displacement, and everything necessary to be known by seamen of the present day. Second edition, illustrated.—John Todd and W. B. Whall. \$3.40.

RESISTANCE AND PROPULSION OF SHIPS—Durand. \$5.

SELF-INSTRUCTOR IN NAVIGATION AND PRACTICAL GUIDE to the examinations of the U. S. Government Inspectors for masters and mates of ocean-going steamships and sailing vessels—Capt. W. J. Smith. Second edition, revised and enlarged. Cloth bound. \$2.

SELF-INSTRUCTION IN THE PRACTICE AND THEORY OF NAVIGATION—Earl of Dunraven. Two volumes. \$7.

SHIP BUILDING—Tables for constructing ship's lines. Second edition. Archibald Hogg. \$2.

SIMPLE ELEMENTS OF NAVIGATION—Young. New second edition. \$2.

SMALL YACHT CONSTRUCTION AND RIGGING—Linton Hope. \$3.

STABILITY OF SHIPS—Sir E. J. Reed. \$3.40.

STEEL SHIPS: Their Construction and Maintenance. A manual for ship builders, ship superintendents, students and marine engineers—Thos. Walton. \$5.50.

TEXT BOOK OF NAVAL ARCHITECTURE—J. J. Welch. \$1.50.

TEXT BOOK OF SEAMANSHIP—Com. S. B. Luce. U. S. N. Equipping and handling of vessels under sail or steam. \$10.

THEORETICAL NAVAL ARCHITECTURE: A treatise on the calculation involved in naval design—Samuel J. P. Thearle. In two volumes. \$3.50.

THEORETICAL NAVAL ARCHITECTURE—E. L. Attwood. Text book; 114 diagrams. \$2.50.

"WRINKLES" IN PRACTICAL NAVIGATION. Ninth edition, revised. S. T. S. Lecky. \$3.40.

YACHT ETIQUETTE—Capt. Howard Patterson. \$1.

Books on Marine Engineering, or the Operation of Engines, and for Beginners in the Engine Room.

AMERICAN MARINE ENGINEER—By Edwards. \$2.50.

ARITHMETIC OF THE STEAM ENGINE—E. S. Gould. \$1.

ELECTRIC LIGHTING—Atkinson. \$1.50.

ELECTRIC LIGHTING FOR MARINE ENGINEERS; or, How to light a ship by the electric light and how to keep the apparatus in order—S. F. Walker. \$2.

ENGINEER'S EPITOME—N. J. Smith. A collection of figures, facts and formulae for engineers. 50 cents.

ENGINEER'S MANUAL OF LOCAL MARINE BOARD EXAMINATIONS—By Ainsley. \$5.

ENGINES AND ENGINE RUNNING—Joshua Rose. For the use of those who desire to pass an examination to take charge of an engine or boiler; illustrated. \$2.50.

EXAMINATION QUESTIONS AND ANSWERS—Emory Edwards. 900 examination questions and answers for young engineers and firemen who desire to obtain marine licenses. \$1.50.

GAS, GASOLINE AND OIL ENGINES. Gardner D. Hiscor. \$2.50.

HAWKINS' AIDS TO ENGINEERS' EXAMINATIONS, with Questions and Answers. \$2.

HAWKINS' SELF-HELP, Mechanical Drawing. \$2.

HAWKINS' NEW CATECHISM OF ELECTRICITY. \$2.

HAWKINS' MAXIMS AND INSTRUCTIONS FOR THE BOILER ROOM. Useful to the engineer, the fireman, to the steam user or owner, and to the student of steam engineering. \$2.

HAWKINS' HAND BOOK OF CALCULATIONS FOR ENGINEERS. Comprises elements of arithmetic, mensuration, geometry, mechanical philosophy, with explanations and help rules useful to an engineer. \$2.

HAWKINS' NEW CATECHISM OF THE STEAM ENGINE. \$2.

HAWKINS' INDICATOR CATECHISM. (A practical treatise.) \$1.

HOW TO RUN ENGINES AND BOILERS. Practical instruction for young engineers and steam users. E. P. Watson. New fifth edition. \$1.

INDICATOR PRACTICE—Hemenway. \$2.

KEY TO ENGINEERING—Invaluable to engineers and firemen about to take examinations. Written in the plainest language and in the form of questions and answers. Postpaid, 75 cents.

KEY TO ENGINES AND ENGINE RUNNING—Joshua Rose. For use of those desiring to pass examination to take charge of an engine or boiler. \$2.50.

LIBRARY OF STEAM ENGINEERING—John Fehrenbach, M. E. \$5.

MANUAL OF MARINE ENGINEERING: Comprising the Design, Construction and Working of Marine Machinery.—A. E. Seaton. New, revised edition. \$6.

MARINE BOILERS: A treatise on the Causes and Prevention of their Priming, with remarks on their general management—Reed. \$2.

MARINE BOILERS—Stromeyer. \$5.

MARINE BOILERS—L. E. Bertin. 250 illustrations, designs and tables. \$7.50.

MARINE ENGINES—R. Murray. \$1.80.

MARINE PROPELLERS—By Barnaby. \$4.50.

MARINE STEAM ENGINE: Its Construction, Action and Management—Carl Busley. A manual and book of reference for engineers, students, ship owners, officers of the navy and mercantile marine, and all interested in steam navigation. Thoroughly revised; third edition. \$15.

MARINE STEAM ENGINES—Sennet & Oram. \$6.

MECHANICS' AND ENGINEERS' POCKET BOOK, including Naval Architecture, Steam and the Steam Engine, Steam Vessels, etc. 64th edition, 1050 pages. Chas. H. Haswell. \$4.

MECHANICAL ENGINEERS' POCKET BOOK—Wm. Kent. Reference book or rules, tables, etc. \$5.

MECHANICAL ENGINEERS' POCKET BOOK—H. H. Supplee. Hand book of tables, formulas and methods for engineers, students and draughtsmen. \$5.50.

MODERN EXAMINATIONS OF STEAM ENGINEERS—W. H. Wakeman. \$2.00.

NAUTICAL ENCYCLOPEDIA, ILLUSTRATED—Howard Patterson. Complete from Standpoint of Marine Engineer and Naval Architect. \$3.

POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.

PRACTICAL MARINE ENGINEERING, for marine engineers and students with aids for applicants for marine engineers' license—Prof. W. F. Durand. \$5.

QUESTIONS AND ANSWERS FOR MARINE ENGINEERS—Theo. Lucas. Containing 807 questions, with fully explained illustrated answers. \$2.

QUESTIONS AND ANSWERS, sixth edition—Stephen Roper. \$2.

REED'S ENGINEERS' HAND BOOK—New edition; illustrated by 345 diagrams and 36 large plates. \$5. 45 cents extra by mail or express.

REED'S KEY to Reed's Hand Book—Contains working of all questions given in examination papers. \$3.

RESISTANCE AND PROPULSION OF SHIPS—W. F. Durand, principal of school of marine construction, Cornell University. \$5.

ROPER'S ENGINEERS' HANDY BOOK for Steam Engineers and Electricians. Revised and enlarged. \$3.50.

SCREW PROPELLER COMPUTER—Prof. Geo. R. McDermott. For quickly determining dimensions and proportions of screw propeller for any set of conditions. \$5.

SCREW PROPELLERS AND MARINE PROPULSION—I. McKim Chase. \$3.00.

SLIDE VALVE—Julius Begtrup. Special reference to Modern Practice in the United States. \$2.

SLIDE VALVE, SIMPLY EXPLAINED—W. J. Tennant. \$1.

SLIDE VALVES—C. W. MacCord, Jr. A book for practical men on the principles and methods of design. \$2.

SMALL ENGINES AND BOILERS—Egbert P. Watson. A manual of concise and specific directions for construction of small steam engines and boilers of modern types; illustrated. \$1.25.

STEAM AND THE MARINE STEAM ENGINE—Jno. Yeo. \$2.50.

STEAM BOILERS—Joshua Rose. Practical treatise, construction and examination. Seventy-three engravings. \$2.50.

STEAM BOILER: Its Care and Management. Stephen Roper. \$2.

STEAM ENGINE: Theory and Practice—Ripper. \$2.50.

TRIPLE AND QUADRUPLE EXPANSION ENGINES AND BOILERS AND THEIR MANAGEMENT—A. Ritchie Leask. Third edition, revised. \$2.

WATER TUBE BOILERS—Fifth revised and enlarged edition of HOW TO RUN ENGINES AND BOILERS—F. P. Watson. Practical instruction for young engineers and steam users. \$1.

SENT TO ANY ADDRESS CARRIAGE PREPAID, AT PRICES NAMED.

There is no book on Navigation, Marine Engineering, Ship Building, or the allied industries that is not either published or for sale by

THE MARINE REVIEW, 39-41 Wade Bldg., CLEVELAND, O.

Neversink Cork Jackets and Life Belt.

Warranted 24 pounds. Buoyancy and full weight of Cork, as required by U. S. Inspectors.

Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST.**CHEAPEST.**

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.



**METALLIC
and
WOODEN
LIFE
BOATS.**



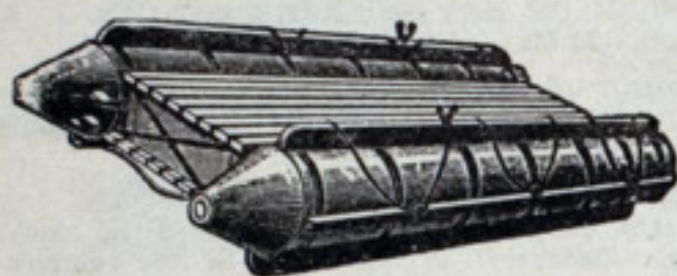
Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact life raft known.

DAVID KAHNWEILER'S SONS.

437 Pearl Street, New York City.

Send for Illustrated Catalogue.

**Thos. Drein & Son.**

BUILDERS of Metallic Life Boats and Rafts, Government and Pleasure Boats, Block and Granulated Cork Life Preservers. Outfits for Lake Steamers a Specialty. Tannal St. below Railroad.

WILMINGTON, DEL.

British Admiralty Charts

Can be obtained from Admiralty Agent by Appointment.

The latest Editions of Charts, Plans and Sailing Directions Published by the British Admiralty.

J. D. POTTER,

145 MINORIES, LONDON, ENGLAND.

OFFICIAL CATALOGUE OF CHARTS (380 pages) 1s.

An Abridged Catalogue of Charts of Nautical Books (free on application.)

One of these binders, that will hold



**52 ISSUES
of the**

**Marine
Review**

will be mailed
to any address
on receipt of

\$1.

THE MARINE REVIEW, 39-41 Wade Bldg. CLEVELAND, O.

PHOSPHOR BRONZE.

REG TRADE MARKS



**THE PHOSPHOR BRONZE SMELTING CO. LIMITED,
2200 WASHINGTON AVE. PHILADELPHIA.
"ELEPHANT BRAND PHOSPHOR-BRONZE"
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.**

— DELTA METAL —

**CASTINGS, STAMPINGS AND FORGINGS.
ORIGINAL AND SOLE MAKERS IN THE U.S.**

DELTA METAL

CRANE FITTINGS

ESTABLISHED 1855

• • Buffalo • •
Wrought Steel Ranges
Are the Best.

Steamboat and Barge Ranges with Rotary Grates.

No Cog Wheels to Warp or get out of order.

Don't take our word for it but ask some one using them.

Russell & Watson, General Steamboat Work
BUFFALO, N. Y. Send for Catalogue.

AGENTS—Topky Bros., Ashtabula Harbor, Ohio.

H. C. Weber & Co., Detroit, Mich.

John Black, So. Chicago, Ill.

Pritzlaff Bros., Milwaukee, Wis.



Phone Call 591A, Greenpoint.

LANE & DeGROOT.

METALLIC LIFE BOATS.

(Formerly Raymond's)

Metallic Life Rafts, Cork Life Preservers, e. c., approved by the U. S. Supervising Inspectors. Also Wood Boats of every description. Repairing of every kind promptly attended to.

305-315 Vernon Ave., Long Island City, N. Y.

FAHEY & CO.

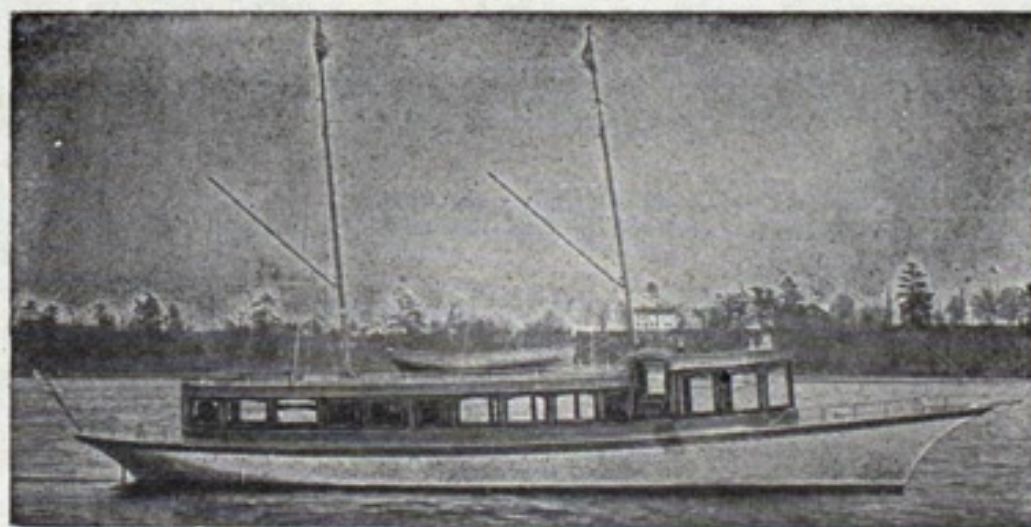
Bankers & Brokers.

TELEPHONE, MAIN 2754.

CLEVELAND, O.

1011-1015 THE WILLIAMSON BLDG.

**EVERY POSSIBLE FACILITY FOR CONDUCTING A BROKERAGE
BUSINESS IN STOCKS, BONDS, GRAIN, ETC.**

A TRUSCOTT BOAT.

SIMPLE. SAFE. SPEEDY. RELIABLE.

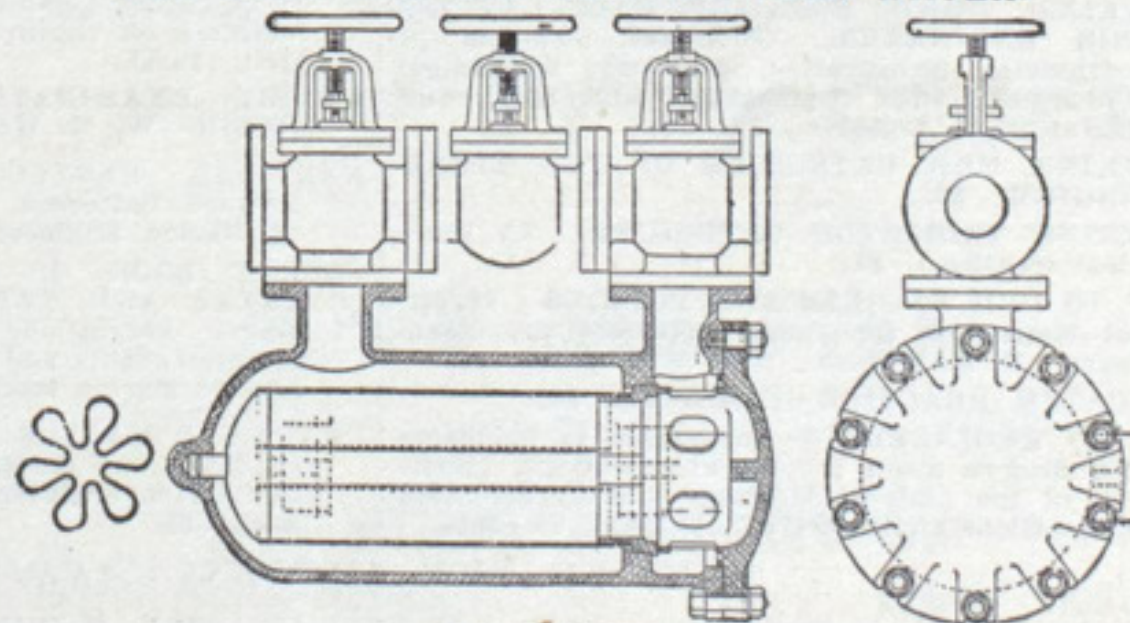
It may be possible to build better and safer boats but it hasn't been done yet. We send a completely illustrated catalogue and price list free, which tells you all about boats and why Truscott Boats Excel.

TRUSCOTT BOAT MFG. CO.

**ST. JOSEPH,
MICH.**

THE EBSSEN GREASE EXTRACTOR

FOR REMOVING GREASE FROM FEED WATER.



MANUFACTURED BY

**JAMES REILLY REPAIR & SUPPLY COMPANY,
229 & 230 West St., NEW YORK CITY.**

JOHN MECKES**The Largest Ground Floor Space Store In Ohio.**STANDARD GRADES IN
Carpets, Rugs, Inlaid Linoleums and
Linoleums.Everything in Bedding and Table Linens
for the Boat Trade. Estimates cheerfully submitted
upon request. It will be to your advantage to try us.**JOHN MECKES,**551-553-555-557-559-561-563-565 PEARL STREET,
Cor. Carroll and McLean Sts.
CLEVELAND, O.**AMERICAN LINE**PLYMOUTH
CHERBOURG
SOUTHAMPTONCALLING AT CHERBOURG WESTBOUND.
Sailing From New York Every Saturday at 9:30 a. m.ST. LOUIS (11,629 tons), ST. PAUL (11,629 tons),
NEW YORK (10,674 tons), PHILADELPHIA (10,433 tons)Special Express Train from Southampton to London in one hour and
forty minutes. Close connection at SOUTHAMPTON for Havre
and Paris by special fast twin-screw Channel Steamers.**RED STAR LINE**NEW YORK
ANTWERP
PARIS

Sailing Every Saturday at 10:30 A. M.

FINLAND (12,760 tons), KROONLAND (12,760 tons),
ZEELAND (11,905 tons), VADERLAND (12,736 tons).One of the Shortest Routes to BELGIUM, HOLLAND, FRANCE,
GERMANY, THE RHINE, SWITZERLAND and ITALY.

Send for "Facts for Travelers."

Office, Empire Building 73 Broadway, New York.

Broad and Sansome Sts., Philadelphia.
India Building, 84 State Street, Boston.
1306 F St., N. W., Washington, D. C.
90-96 Dearborn St., Chicago.
Century Building St., Louis.
Guaranty Building, S., Minneapolis
21 Post St., San Francisco.PIERS: 14 & 15 NORTH
RIVER, FOOT OF FUL-
TON ST., NEW YORK.**Geo. Stratford
Oakum Co.**JERSEY CITY, N. J.
ESTABLISHED 1860
Manufacturers of
all grades of**OAKUM**

Spun Cotton.

For sale at Ship
Chandlers
everywhere.**The Williams & Rodgers Co.,**

Superior and Seneca Sts., CLEVELAND, OHIO.

Carpets, Rugs, Furniture, Curtains, Bedding and
all other Furnishings used in Cabins**WE MAKE A SPECIALTY
OF FITTING OUT BOATS****SPECIAL RATES TO THE MARINE TRADE.**Bring your Boat wants and your Family wants to this store, and
we will take the very best care of you. Dry Goods, House-fur-
nishings, Carpets, Furniture, and all other articles found in a first-
class Dry Goods House.**THE WILLIAMS & RODGERS CO.,**
CLEVELAND, OHIO.

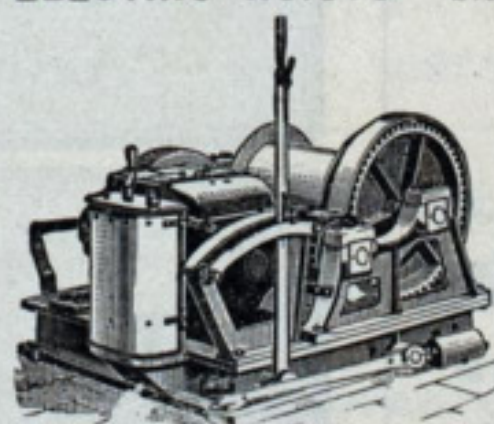
MARINE CHAIN

OF ALL KINDS.

Ships Cables, Dredge Chains,
Stud Link and Marine Railway Chains,
Steam Shovel Chains, Boom Chains, Etc.

CERTIFICATE OF TEST FURNISHED.

STANDARD CHAIN CO.
PITTSBURGH, PA.

LIDGERWOOD HOISTING ENGINES.Over 22,000
in use.**ELECTRIC HOISTS**Specially adapted for Docks, Warehouses and
Steamships.

Lidgerwood Electric Hoist.

**Lidgerwood Miller
Marine Cableway**will transfer Coal, Ammunition Supplies,
etc., from ship to ship at sea.

SEND FOR CATALOGUE.

LIDGERWOOD MFG. CO..
96 LIBERTY ST., NEW YORK.

SHELBY

COLD DRAWN SEAMLESS
BOILER TUBES
SUITABLE FOR
ALL CLASSES OF
MARINE BOILERS
SHELBY STEEL TUBE CO.
PITTSBURG, PA.
BRANCH OFFICES-NEW YORK-CHICAGO.

THE ORIGINAL

McINNES' (ENGLISH) COMPOSITIONFOR BOTTOMS OF IRON AND STEEL SHIPS---THE
FASTEST COATING FOR STEAMSHIPS AND YACHTS.**"SLIPPERY AS AN EEL"---HENCE LESS COAL USED**

MADE BY MESSRS JOHN McINNES & SON OF LIVERPOOL.

Captain Sargent of William Cramp & Sons of Philadelphia says: "I always ask for McInnes' English Composition; I must have McInnes' Paint to get speed."

Beware of Imitations Being Sold on the Market as McInnes'.

GEO. W. PIPER, SOLE AGENT
FOR U. S. A.**55 South Street, New York.**Manufacturer of ANTI-CORROSIVE INSIDE HULL PAINTS AND ENAMELS. BOOT-TOPS, DECK PAINTS,
COPPER BOTTOM PAINTS AND YACHT ENAMELS.

CABLE ADDRESS, DAMPIPPER.

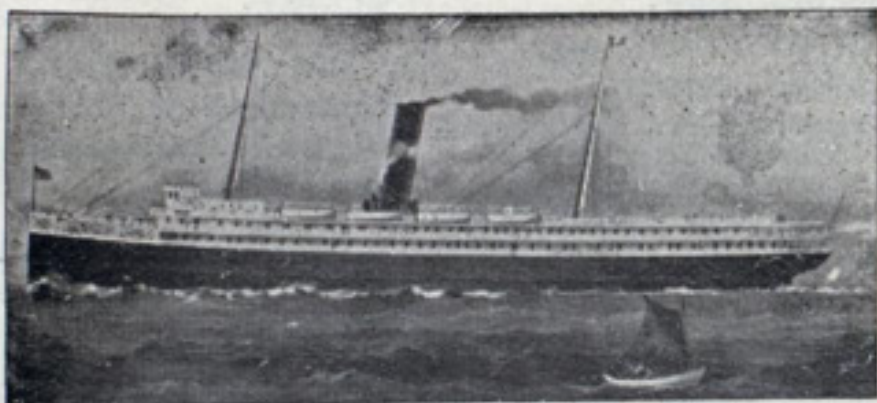
TELEPHONE CALL, 1326 BROAD.

**The Wm. Cramp & Sons
Ship and Engine Building Co.**

PHILADELPHIA, PA.

BRASS FOUNDRYPARSONS
MANGANESE BRONZEPARSONS
WHITE BRASS

Propeller Castings of all kinds a specialty.

Castings and Ingots for marine and land purposes
of high tensile strength and best composition.**ROACH'S SHIP YARD.**Delaware
River Iron
Ship-Build-
ing & En-
gine Works
Chester, Pa.

Builders of Steamships and Marine Machinery.

SHIP-BUILDING IN ALL ITS BRANCHES.

NEW YORK OFFICE, MORGAN IRON WORKS Foot E. Ninth St.

Fore River Ship and Engine Co. Successors to
Fore River Engine Co.

Steel Ship and Marine Engine Builders.

CONTRACTORS FOR

U. S. Torpedo Boat Destroyers Lawrence and Macdonough.
U. S. Protected Cruiser Des Moines.
U. S. Battleships New Jersey and Rhode Island.
U. S. Steam Light-Vessel No. 72.

OFFICE AND WORKS, QUINCY, MASS. U. S. A.

The Atlantic Works, Builders of
Steamships,
Steam Yachts,
Tow Boats Etc
EAST BOSTON MASS.Marine Engines, Boilers and Tanks.
Heavy Machinery and Plate Iron Work
Three Marine Railways.**Risdon Iron Works**

Build STEEL AND IRON SHIPS

MARINE WATERTUBE BOILERS, ENGINES

Works—Potrero.

Office—Steuart & Folsom Sts.

SAN FRANCISCO, CAL.

**Newport News Shipbuilding AND Dry Dock Co.
SHIP and ENGINE BUILDERS.**

Equipped with two large basin dry docks of the following dimensions:

	No 1	No 2
Length on top.....	610 ft	827 ft
Width on top.....	130 ft	162 ft
Width on bottom.....	50 ft	80 ft
Draught of water over sill.....	25 ft	30 ft

Shops are equipped with modern machinery capable of doing the
largest work required in ship construction.Tools driven by electricity and compressed air used in constructing
and repairing vessels.

For estimates and further particulars, address

C. B. ORCUTT, President.**No. 1 BROADWAY, NEW YORK.**

Works at Newport News, Va. (On Hampton Roads.)

The Allen Dense-Air Ice MachineContains no chemicals, only air. Proven by many years' service in the
tropics on United States men-of-war, steam yachts and passenger steamers.

A HUNDRED ARE IN DAILY SERVICE ON STEAMERS.

H. B. ROELKER, 41 Maiden Lane, NEW YORKConsulting and Constructing Engineer. Designer and
Manufacturer of Screw Propellers.**The Shipowners Dry Dock Co.
Chicago, Ill.**Building and Repairing of Steel and Wooden Ships with economy
and dispatch.Yard and Dry Docks: Halstead St. and North Branch
Largest Dry Dock: 480 ft. on keel blocks.

Office, 381 No. Halstead St. Phone, North 1658.

MANITOWOC DRY DOCK COMPANY

SHIP BUILDERS

Facilities for Repairs to Steel and Wooden Vessels.

MANITOWOC

WIS.

THE LOCKWOOD MANUFACTURING CO.

EAST BOSTON, MASS.

ENGINEERS AND MACHINISTS.

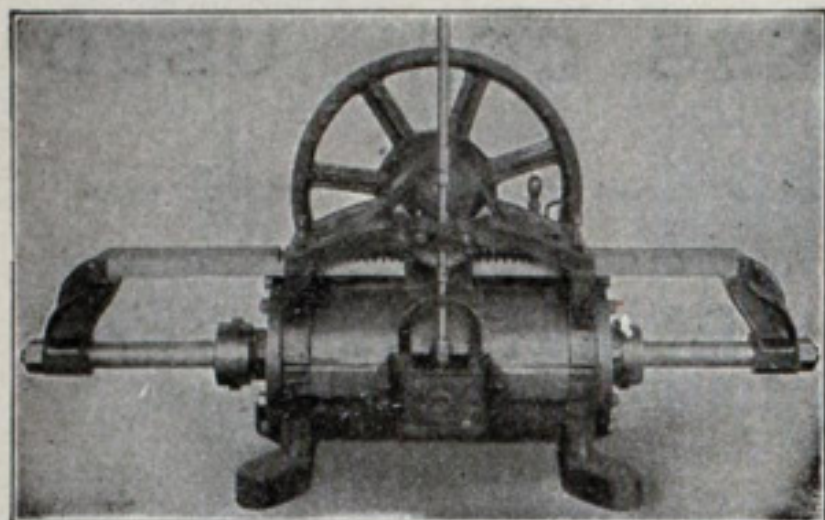
Builders of STEAMSHIPS, TOW BOATS and MARINE ENGINES
REPAIRING OF HULLS AND MACHINERY.**W. & A. FLETCHER CO.**

NORTH RIVER IRON WORKS.

MARINE ENGINES, BOILERS, Etc.Hudson. 12th and 14th Streets, Hoboken, N. J.
Take Ferry from foot of West 14th St., N. Y.

A STEAM STEERER

DIRECT AND POSITIVE
QUICK ACTING. SPECIALLY ADAPTED



for
Steam Yachts,
Ferryboats,
Lake, Ocean
and
Harbor
Tug Boats.

Send for Catalogue and Particulars
MOULTON STEERING ENGINE CO.
17 State St., NEW YORK CITY.

SMOOTH-ON

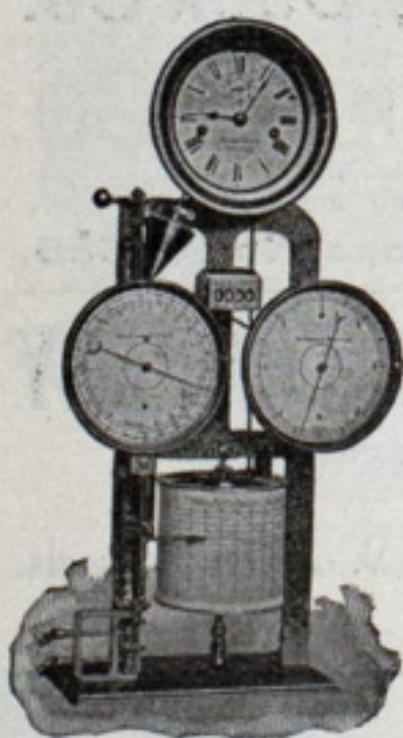
TRADE MARK

Iron Cement No.1

Unequaled for boiler patching, making flanged joints, stopping leaks in boiler seams, it has saved the use of many boilers, and for foundry use. SMOOTH-ON when mixed with water becomes a hard metallic iron that expands and contracts with the iron, and will withstand fire, steam, water or oil. sold in 5, 10 and 25 pound blue labeled cans. 60 page catalogue, and name of nearest jobber on request.

SMOOTH-ON MANUFACTURING COMPANY

572-574 Communipaw Ave., JERSEY CITY, N. J., U. S. A.
Chicago Office, 61 N. Jefferson Street.



The Nicholson Perfected Ship Log

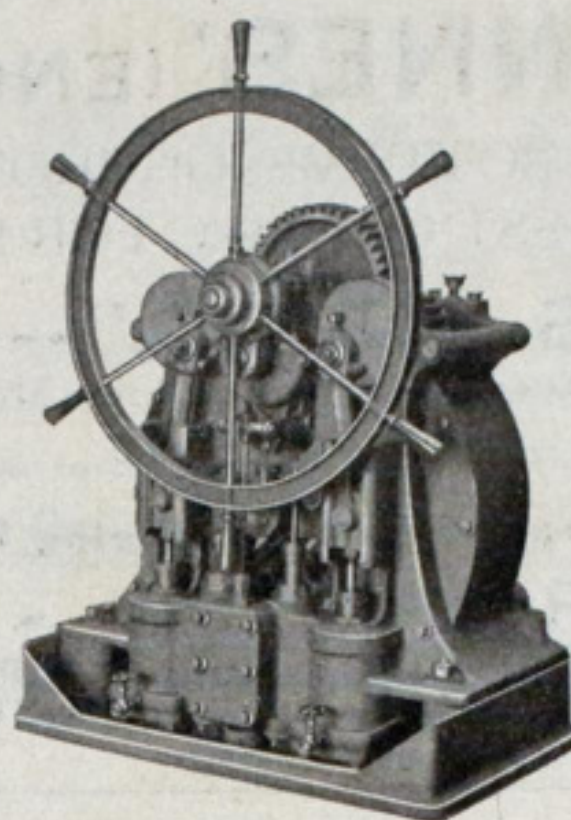
is the only log that accurately shows the speed of the moment of a ship, on a dial, and records this speed on a paper chart for every minute of the trip. It also registers the distance travelled. No line overboard. Placed in chart house or wherever desired.

THE Nicholson Marine Distance Finder.

ADVANTAGES CLAIMED:

The exact distance from any fixed point can readily be determined without any mathematical calculation. Anyone can easily learn to use it.

Nicholson Ship Log Co. 204 Superior St.,
CLEVELAND, O.



BECK STEAM AND HAND STEERING GEAR.

Changed from steam to hand gear instantly. Rudder moved hard over through one or more turns of wheel as desired. Is self-locking. Will cushion any blow on rudder and return to position automatically. All gears are machine cut. Position of Rudder shown by Indicator at all times.

Pawling & Harnischfeger,
Clinton and So. Water Sts., MILWAUKEE, WIS.

Northwestern Steam Boiler & Mfg. Co.

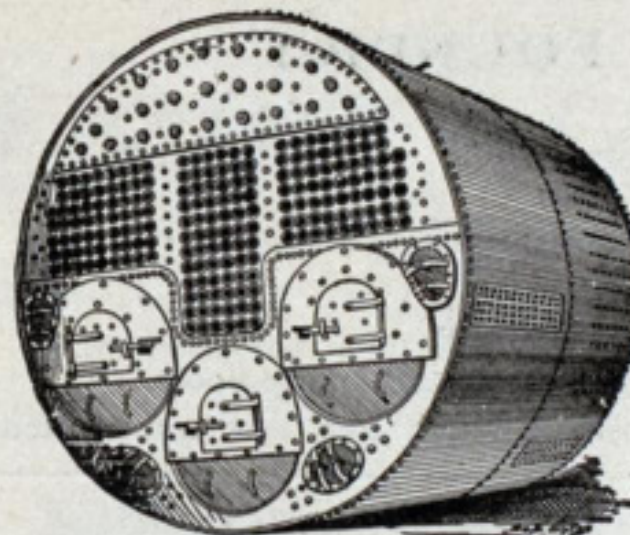
DULUTH, MINN.

MANUFACTURERS OF

**Boilers, Engines and
Machinery.**

Special facilities
for Marine Work.
Repairs promptly
attended to Night
or Day.

We carry a complete line of Marine and Engineers' Supplies.

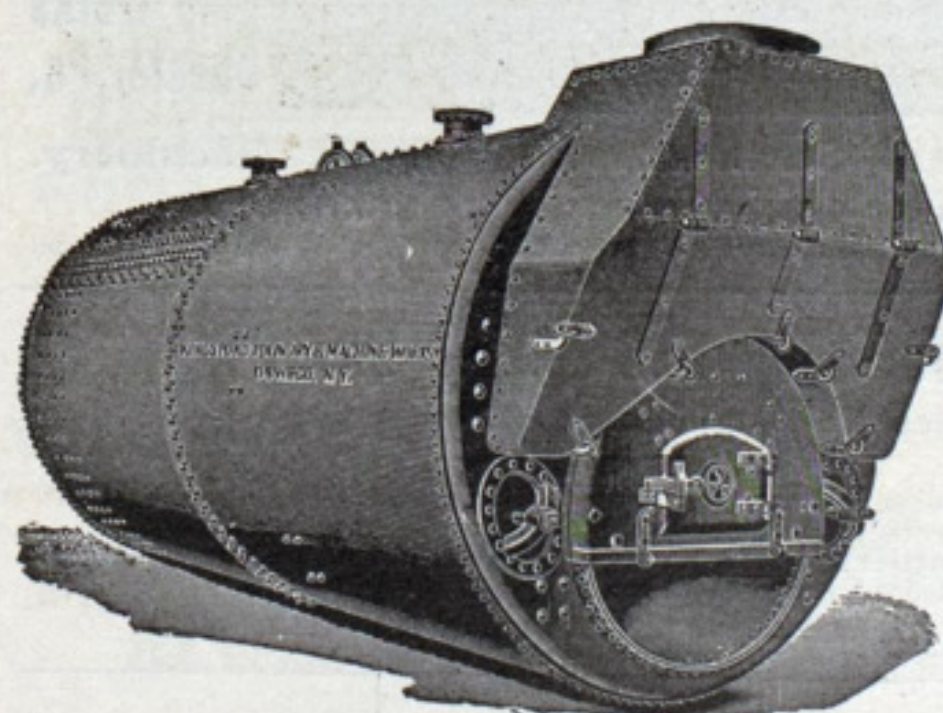


TELEPHONES:

OFFICE AND WORKS, 615.

Residence Calls:

M. A. RYAN, Pres. and Gen'l Mgr., 776 R.
J. H. OPPERMAN, Secretary, 579 R.
E. KRIZ, Superintendent, 557 M.



M
A
R
I
N
E
B
O
I
L
E
R
S

Centrifugal Pumping Machinery For All Purposes.
KINGSFORD FOUNDRY AND MACHINE WORKS,
OSWEGO, N. Y.

Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian and United States Light House Departments for Channel and Harbor Lighting; over 1700 gas buoys and gas beacons in service.

Burn Continuously

Brilliant and Steady Illumination.
Economical and Reliable in Operation.

Controlled by the

from 80 to 365 days and nights without attention,
and can be seen a distance of six miles.

SAFETY CAR HEATING and LIGHTING CO.
160 Broadway, New York City.

THOMAS WALKER & SON,

BIRMINGHAM, ENGLAND.

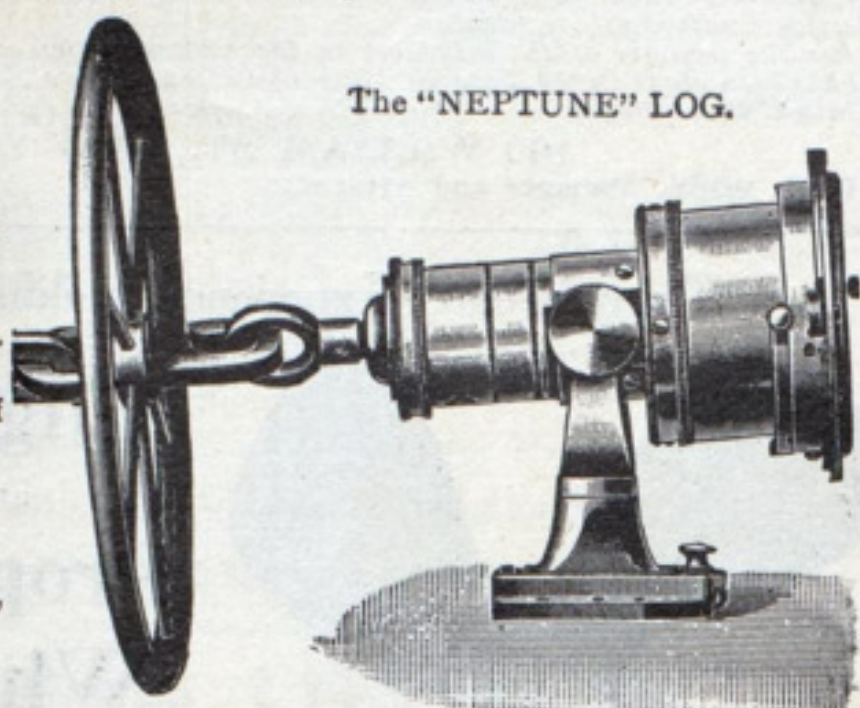
THE
"NEPTUNE"
SHIP-LOG

With
Ball Bearings
for
HIGH
SPEEDS.

Also makers of
the

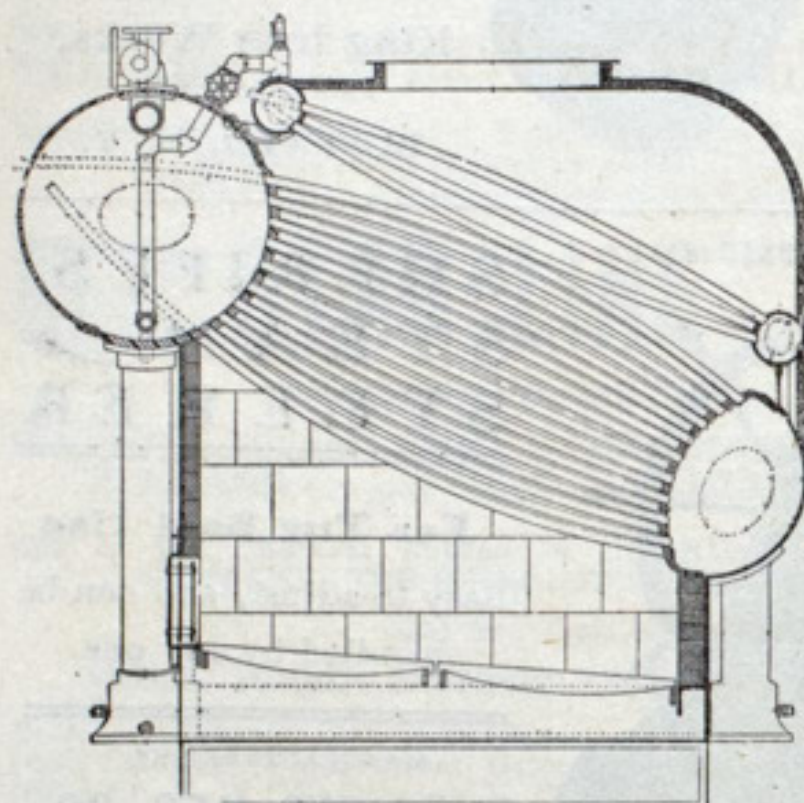
"CHERUB"
and
"HARPOON"
SHIP-LOGS.

The "NEPTUNE" LOG.



MAKERS TO THE BRITISH NAVY.

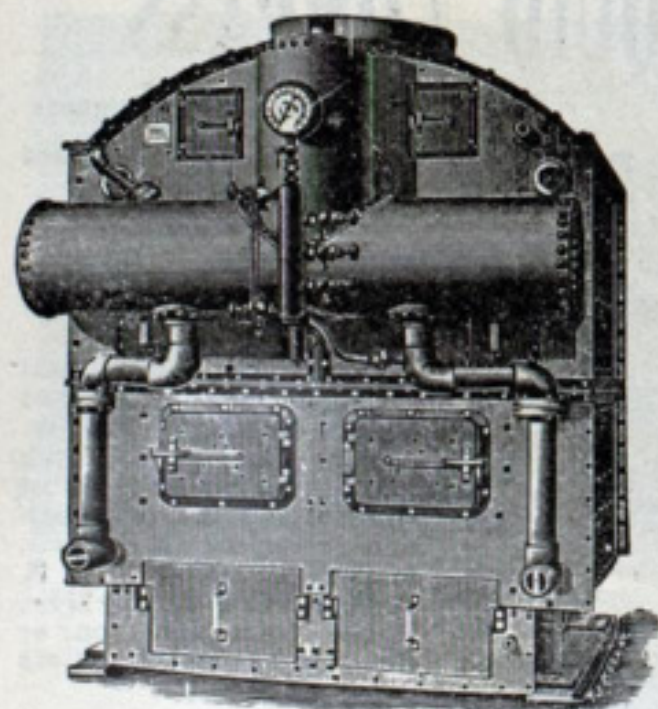
THE MOSHER PATENT WATERTUBE BOILER.



Simplest, lightest and most compact boiler made. Most accessible for cleaning and repair. Five vertical rows or as many as 45 tubes may be cleaned or withdrawn by removing the cover from a single hand hole. Largest grate surface on a given floor space. No joints in the fire. All joints expanded. Greater steam room and water capacity than any other boiler. Built in sizes up to 2000 H. P. Mosher Boilers have been supplied for eleven torpedo boats and the monitor Florida of the U.S. Navy, amounting to over 26,000 H. P.; six torpedo boats for the Russian Navy, two gunboats for the Mexican government, one cruiser and one torpedo boat for the Brazilian government; the steam yachts Arrow, Ellide, Feisen, Wauneta, Presto, and numerous other yachts and vessels.

SEND FOR DESCRIPTIVE CATALOGUE.

MOSHER WATERTUBE BOILER CO., No. 1 BROADWAY, N. Y.



250 STEAM VESSELS

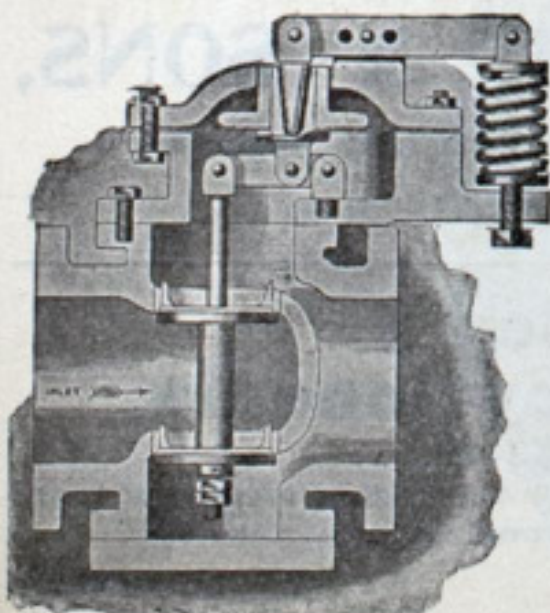
Now Equipped With

**ALMY'S PATENT
SECTIONAL
Water Tube Boilers**

Bear Evidence of Their
Excellent Qualities

**Almy Water-Tube
Boiler Co.**

PROVIDENCE, R. I.



**KIELEY
MARINE REDUCING VALVE.**

Best Valve Made for Marine Work.

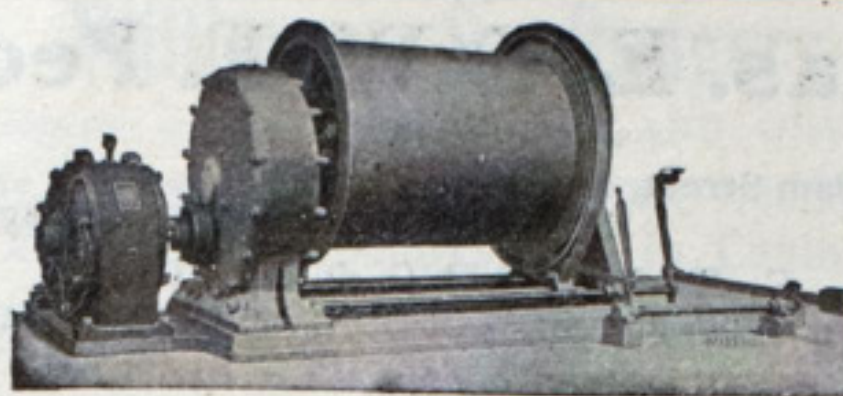
ALSO

Expansion Traps, Steam
Separators and Open Float
Traps for Marine Purpose
sent on trial.

KIELEY & MUELLER

7-17 West 13th St., N. Y. City.
Write for Catalogue.

Good for any pressure.



Westinghouse Type C Induction Motor Driving Friction Drum Hoist.

Westinghouse Motors

Alternating and Direct Current

Can be relied upon for severe
and continuous service.

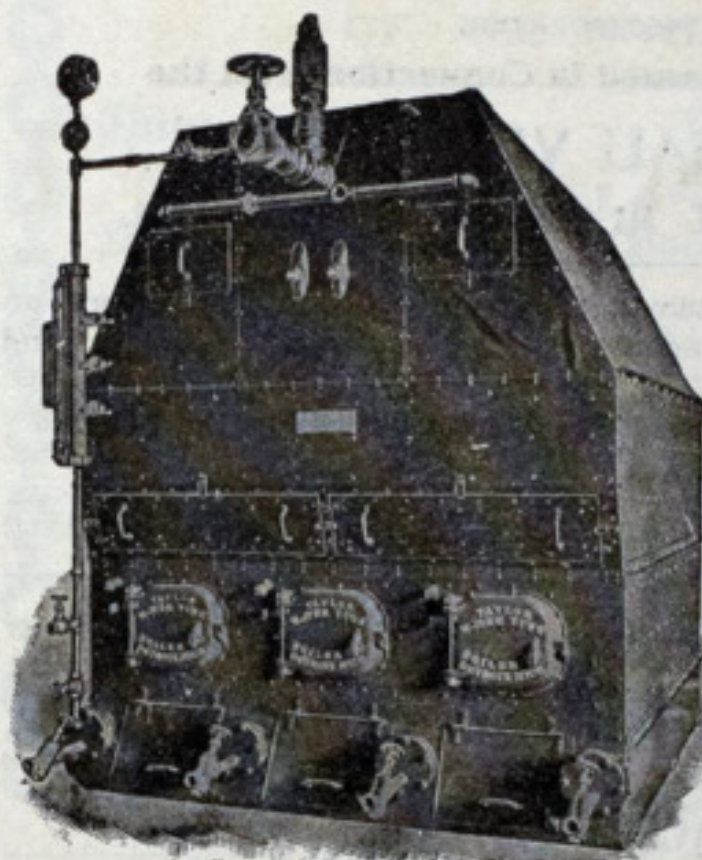
Westinghouse Electric & Mfg. Co.

Sales Offices in all Large Cities

Pittsburgh, Pa.

For Canada: Canadian Westinghouse Co., Limited, Hamilton, Ontario.

Taylor Water Tube Boiler Co.



322 Franklin St.,
DETROIT, MICH.

Vertical Tubes,
sectional, large
steam space and
liberating area.

Fire box, com-
bustion chamber,
and course for the
furnace gases sim-
ilar to the Scotch
Marine.

Free circulation
type.

Send for full description.

The MARTIN-BARRISS Co.

IMPORTERS AND MANUFACTURERS OF

**MAHOGANY, WHITE MAHOGANY
AND ALL NATIVE CABINET WOODS**

High Grades of Kiln Dried Woods for Cabin Work and Inside Trim.

White Oak Timbers and Plank

Constantly on Hand and Sawed to Order on Short Notice,

654 SENECA ST. CLEVELAND, O.

H. MOOERS COMPANY,

Dealers In

Pipe, Valves, Fittings, and Marine Engineers'
Supplies.

Machine and Steam Fitting Shop.

Second and Sycamore Streets,

MILWAUKEE, WIS.

CRANE VALVES

ESTABLISHED 1855

Chas. E. & W. F. Peck

ESTABLISHED 1870

58 William Street, New York City.

Royal Insurance Building, Chicago, Ill.

C. T. BOWRING & CO., Ltd.

5 and 6 Billiter Ave., LONDON, E. C., ENGLAND,

AND AT "LLOYDS," LONDON.

Insurance Brokers

As brokers we represent ONLY THE ASSURED. Our clients being the VESSEL OWNERS, we refuse to represent insurance companies. We place insurances in the most advantageous market at the best procurable rates and terms. We leave it to the managers and general agents of insurance companies to protect the interests of their companies, maintaining that it is impossible for us to devote ourselves to the interest of both the owners and the insurance companies at the same time.

Average Adjusting Department

Williamson Building. Cleveland, Ohio.

GREAT LAKES REGISTER.

INCORPORATED,

Combined and Issued in Connection with the

BUREAU VERITAS

INTERNATIONAL REGISTER OF SHIPPING.

Great Lakes Register desires to announce that its ratings go before the leading Underwriters of America, England and France.

THE SERVICES OF ITS SURVEYORS MAY BE ENGAGED ON HULL AND CARGOES

F. D. HERRIMAN, SURVEYOR GENERAL,

320-322 Perry-Payne Building, - - CLEVELAND, O.

The Only Standard American Classification of Shipping.



Has Authorized Agents in all the principal ports of the world to protect the interests of its patrons. Vessels built under its rules, or holding certificates of class in this Record of Shipping will, with their Cargoes, insure at lowest rates. Office, 66 Beaver Street, New York.

A. A. RAVEN, President.
W. H. H. MOORE Treasurer.

W. R. T. JONES, Vice President,
W. IRVING COMES, Secretary.

The Donnelly Salvage and Wrecking Co., Ltd.,

KINGSTON ONT.

DIVERS, STEAM PUMPS, TUGS, Etc.

SUPPLIED ON SHORTEST NOTICE.

JOHN DONNELLY, SR., Pres.
JOHN DONNELLY, JR., Vice-Pres.
H. B. FOLGER, Treas.
THOS. DONNELLY, Secy.

THE FRANKFORT Marine, Accident and Plate Glass INSURANCE CO.

of FRANKFORT-ON-THE-MAIN, GERMANY.

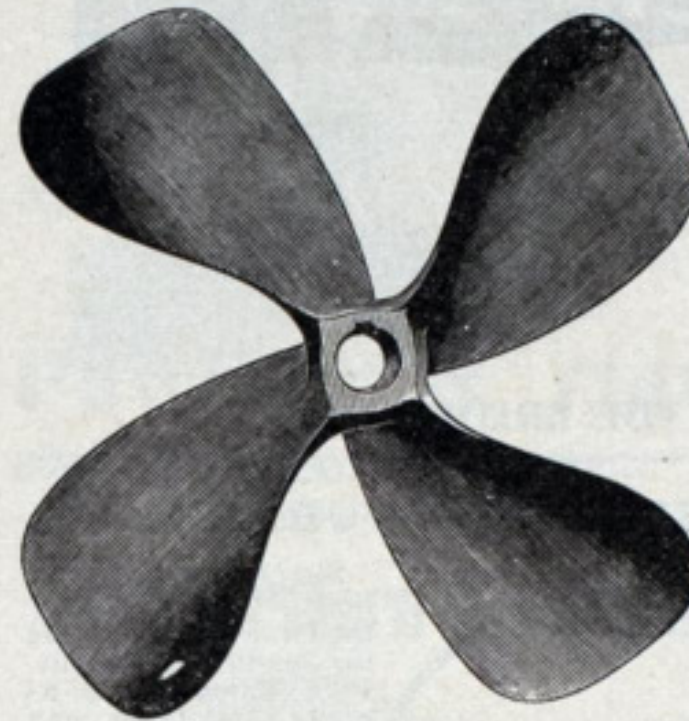
Employers Teams and Public Liability, Elevator Insurance, Workmen's Collective, Individual Accident.

For the security of Policyholders in the United States of America, a deposit has been made in the States of Massachusetts and New York of \$400,000.00 in United States Bonds.

UNITED STATES DEPARTMENT,
100 WILLIAM ST., NEW YORK, N. Y.

F. G. VOSS, Manager and Attorney.

Thirty Years' Experience building



Engines and Propeller Wheels.

H. G. TROUT,
King Iron Works,
226 Ohio St.,
BUFFALO, N. Y.



ESTABLISHED 1854

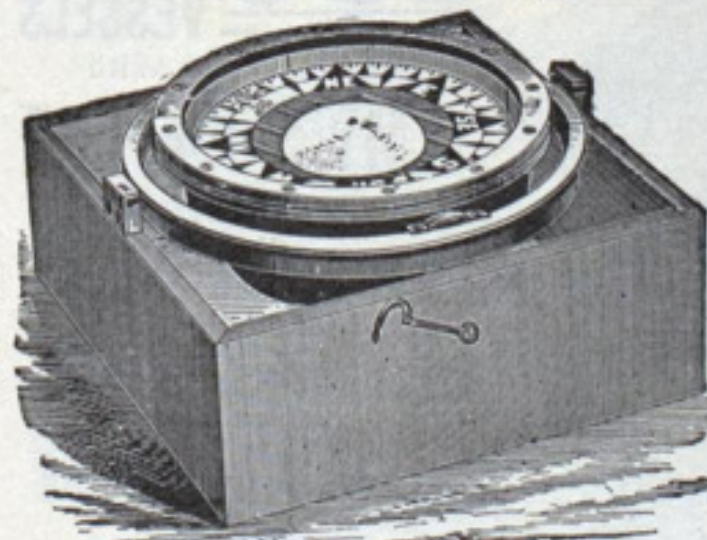
SHERIFFS' STEAM STEERER

For Tug Boat Use

Easy to adjust, and can be handled by any one.

MANUFACTURED BY
SHERIFFS MFG. CO.,
Milwaukee, Wis.

RITCHIE LIQUID COMPASS



six needles, the best instrument for iron ships. and nautical instrument dealers.

The Standard Liquid Compass.
Used Exclusively by the United States Navy For Over 35 Years.

Over 25,000 Used in Merchant Service.

Made in all sizes and styles, from 2 to 12 inches diameter of card. All compasses made by us have our name printed below the North point, or prominently upon the card. **NONE OTHER ARE GENUINE.** Latest form with four or

CATALOGUE FREE.

E. S. RITCHIE & SONS,

Manufacturers of Nautical and Physical Apparatus,

BROOKLINE, MASS., U. S. A.

Patterson's Nautical Encyclopedia.

PRICE, \$3.00

Is in all respects a work up to date, correct as to every term known to the shipping world. Sent upon approval. Carriage prepaid.

THE MARINE REVIEW

CLEVELAND.

ALFRED B. SANDS & SON
MARINE PLUMBERS
AND MANUFACTURERS OF
Marine Plumbing Specialties

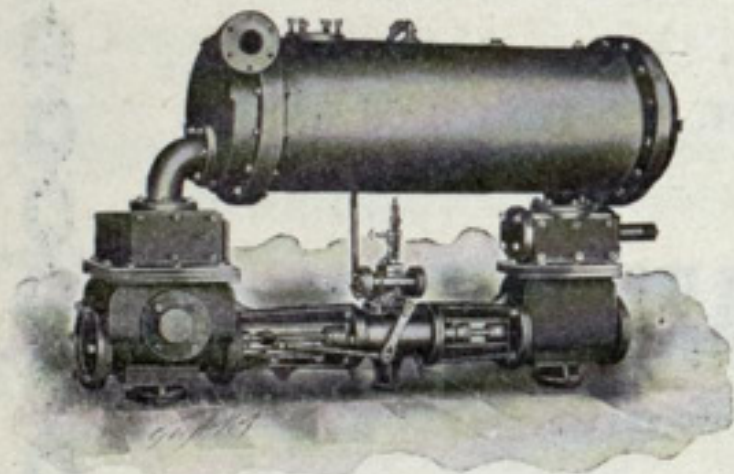


Marine Water Closet for either above or below water line.

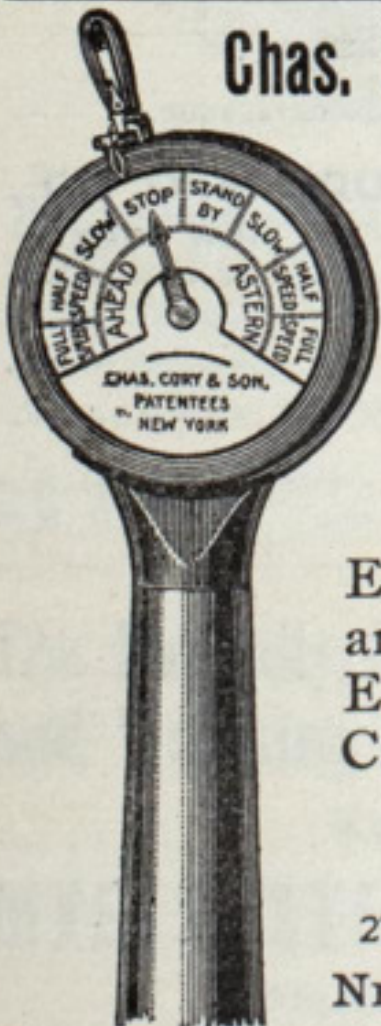
Folding Lavatories, Ventilators, Pumps, Tanks, &c., &c.

134 BEEKMAN ST., New York.

**JOHN E. THROPP
& SONS CO.,**
TRENTON, N. J.



BUILDERS OF
Marine and Stationary Engines and Boilers,
Surface Condensers,
Propeller Wheels and Shafts,
Thrust Bearings,
Machinery of Every Description.

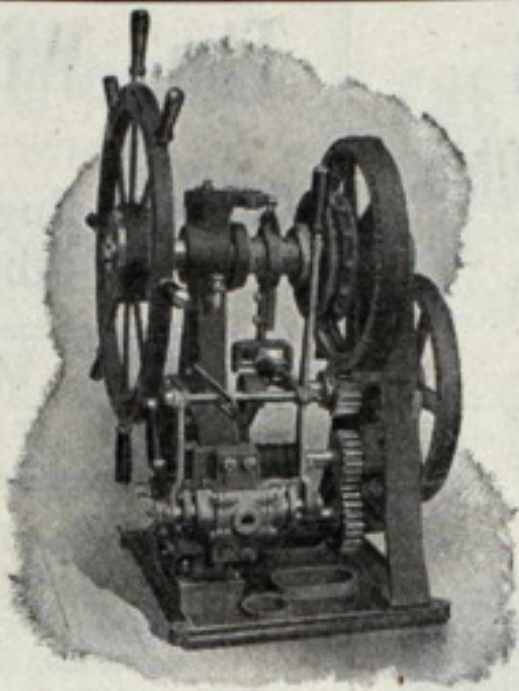


Chas. Cory & Son,

Manufacturers of
Mechanical
and
Electrical
Telegraphs
and
Indicators.

Engine Bells
and
Electric
Call Bells.

278-279 Division St.
NEW YORK CITY.



**THE DAKE PILOT HOUSE
STEAM STEERER.**

A Simple Compact and Durable
Machine. Occupies Small Floor
Space.

Write for descriptive circulars and prices.

MANUFACTURED BY

The Dake Engine Co.,
GRAND HAVEN, MICH.



PIPE JOINT COMPOUND of pure flake graphite that will never "set," that will make the tightest joints, that will resist all rust and corrosion and guarantees an easy separation at any time for flanges or screw joints, bolts, nuts or manhole covers. SUCH IS DIXON'S. Economical and remarkably useful. At your request we will send Booklet 77D and a sample.

Joseph Dixon Crucible Co., Jersey City, N. J.

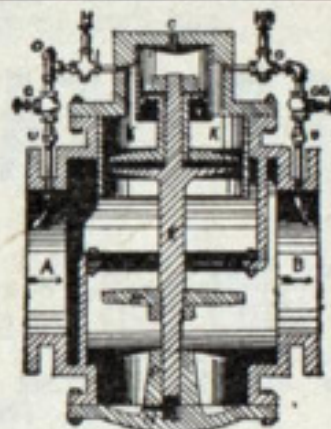
**WATER
FILTERS
REGULATORS
& ENGINES**

We make **Pressure Regulating Valves** for all purposes, steam or water.

Our **Feed-Water Filter** will keep oil out of your boiler.

We can interest you if you use a condenser.

Water Engines for Pumping Organs



THE ROSS VALVE CO. TROY N. Y.

Water Works Regulating Valve
Has no peer
Ask for list of Water Works
using our valves.

Specify
LUNKENHEIMER
"Victor" Gate Valve
"An up-to-date high pressure valve"

Specify
LUNKENHEIMER
Pressure Oil Cups
"Indispensable on pressure oiling systems"



LEBANON, PA.

Manufacturers of **HAND MADE CHAINS** of all grades.
SHIPS' CABLES, DREDGE CHAINS, CRANE CHAINS, BLOCK CHAINS.
Large chains furnished side or end welded. High grade tested chains a specialty.
We manufacture our own iron. We are licensed testers for Lloyds Association, American Bureau of Shipping and Bureau Veritas.



STEAMBOAT FUEL AT CHICAGO. . . .

Youghioghenny and
Lehigh Coal Company.

J. T. CONNERY, ARCHIE J. HITCHCOCK,
Manager Dock Sup't.
Main Office: 902-908 Fisher Bldg.,
277 DEARBORN STREET.

FUEL DOCKS.

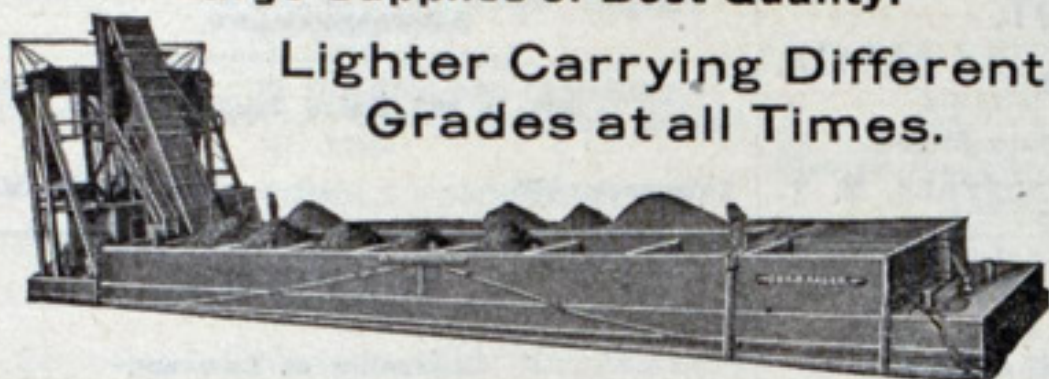
No. 1, Michigan Slip and Basin, - - - Phone Har. 4156.
No. 2, North Halsted Street Bridge, - - - Phone Har. 4157.
No. 3, Foot South Water St. and Illinois Central Slip C.
Phone Har. 4158.

FUEL LIGHTER.

Equipped with 125 2-ton Buckets for Fueling Anywhere in Harbor.
Long Distance Telephone, Har. 4156.

Steamboat Fuel at Ashtabula.

Large Supplies of Best Quality.



Lighter Carrying Different
Grades at all Times.

Fuel Scow with elevators and discharging spouts. Storage of 800 tons.
Discharges 250 tons an hour into steamers while unloading cargo.

M. A. Hanna & Co., Miners and Shippers,
Main Office, Perry-Payne Bldg., Cleveland.

STEAMBOAT FUEL

at TOLEDO and HURON.

IRONVILLE DOCK & COAL CO.,

429 Spitzer Building, Toledo, Ohio.

Office, Main 1513. : : : Bell Phones : : : Dock, East 63.

Coal of Best Quality MASSILLON & PITTSBURG No. 8.

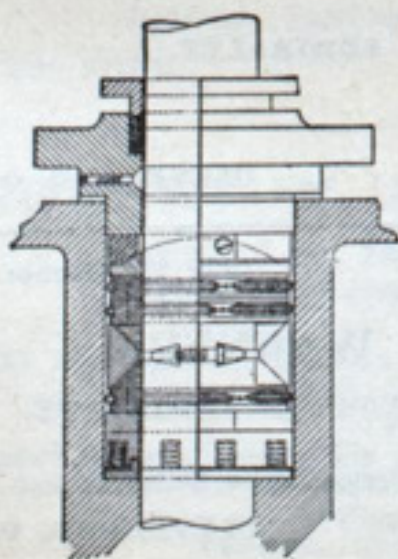


IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

Katzenstein's Self-Acting Metal Packing.

For PISTON RODS, VALVE STEMS, etc.,
of every description for Steam Engines, Pumps,
etc., etc. Adopted and in use by the principal
Iron Works and Steamship Companies in this
and foreign countries. FLEXIBLE TUBU-
LAR METALLIC PACKING, for slip-joints
on Steam Pipes, and for Hydraulic Pressure;
also METAL GASKETS for all kinds of
flanges and joints. For full particulars and
reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, En-
gineers' Supplies,
358 WEST ST., NEW YORK.

The Rochester & Pittsburgh Coal
& Iron Co.

Steamboat Fuel Dock—
Blackwell Canal at
Michigan St. Bridge. 1400 feet of dock
frontage. Hulett Car Dumping Ma-
chine. Steam Fuel Scow of 600 tons
capacity. Boats coaled day or night.
Office: 684-88 Ellicott Sq. Buffalo, N. Y.
Tels. Bell, Seneca 1245, Frontier 27002
E. McQ. Duthie, Cargo and Fuel Agent.

REYNOLDSVILLE
COAL



J. B. COWLE, Pres.

W. E. PERKINS, Sec'y and Treas

MAT. THOMAS, Gen'l Mgr.

The Union Machine & Boiler Company,

MACHINISTS, FOUNDERS AND BOILER MAKERS.

Jobbing solicited. Steel vessel repairs promptly attended to night or day.

108 TO 114 RIVER STREET. CLEVELAND, O.

Phones: Bell Main 609. Cuy. A. 711. Night Call Cuy. M. 1843.

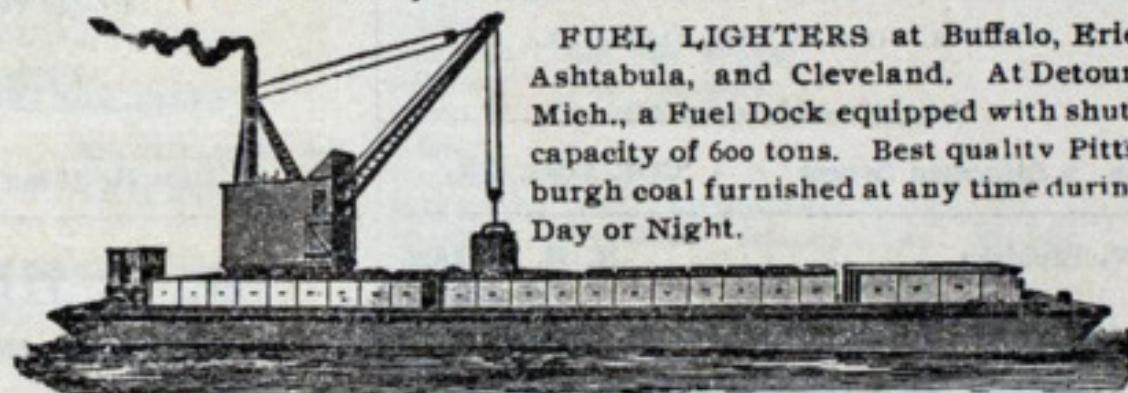
ABRAM SMITH & SON,

ALGONAC, MICH.

Wooden Ship Building and Rebuilding.

Before placing your work we will be pleased with an oppor-
tunity to quote YOU our prices.

PICKANDS, MATHER & CO.,



FUEL LIGHTERS at Buffalo, Erie,
Ashtabula, and Cleveland. At Detour,
Mich., a Fuel Dock equipped with shute
capacity of 600 tons. Best quality Pitts-
burgh coal furnished at any time during
Day or Night.

Western Reserve Building, CLEVELAND, O.

De Grauw, Aymar & Company.

ESTABLISHED 1827.

Cordage, Oakum, Vessel
and Railroad Supplies.

SOLE MANUFACTURERS IN THE UNITED
STATES FOR
TYZACK'S STOCKLESS ANCHORS.
NEW YORK CITY.

BETTER and More ECONOMICAL than DRILLED BOLTS.



FALLS HOLLOW BOLTS are self-inspectors. Afford protection against
explosions. Are of uniform strength and flexibility. Hole is central, admits
air, which aids combustion. Superior quality guaranteed. Samples of either
Hollow or Solid furnished on application. Ask for our latest price list.

VESSEL AND INSURANCE AGENTS.

T. R. MCCARTHY,

STEAMSHIP and FREIGHT BROKER.

Chartering, Forwarding and General Commission Agent; and Broker for the Sale, Purchase and Construction of Steamers and Sailing Vessels.

Marine and Fire Insurance Effectuated.
Cable address: "MACARTHY, MONTREAL."
(Watkins', Scott's, Lieber's and A. B. C. Codes used.)

Shipping Agent to THE ASBESTOS & ASBESTIC CO., Ltd., of Danville, Que.
and
The Belgo Pulp & Paper Co., Shawinigan Falls, Que.

6 St. Sacramento St. - - - - - Montreal, Can.
Correspondence invited and Agencies Solicited.

Insurance.**Prindiville & Company,**

Average Adjusters. Insurance Brokers.

12 Sherman Street,

Chicago.

Representing:
Johnson & Higgins, New York.

Represented by:
Willis Faber & Co., Ltd., London.
Jno. D. Tyson & Co., Liverpool.

P. H. FLEMING & CO.

INSURANCE and VESSEL AGENTS

MARINE, FIRE, OCEAN, LIABILITY.

Telephone Harrison 1359

No. 2 Sherman Street - - CHICAGO, ILL.

C. W. Elphicke.

H. B. Earhart.

C. W. ELPHICKE & CO.,

VESSEL AND INSURANCE AGENTS,

No. 6 Sherman St.,

CHICAGO, ILL.

Telephone, Harrison 1194.

D. Sullivan.

F. J. Sullivan.

D. SULLIVAN & CO.

VESSEL AGENTS.

MARINE INSURANCE.

2-4 Sherman Street, - - - - - CHICAGO, ILL.

Office Tel., Harrison 2847; Residence, Ashland 2483.

W. A. Hawgood.

Arthur H. Hawgood.

W. A. HAWGOOD & CO.,

VESSEL and INSURANCE AGENTS.

220-221 Perry-Payne Bldg., - - - CLEVELAND, O.

Office Telephone, Main 2395.

Residence Telephone, W. A. Hawgood, Doan 84-J.

Residence Telephone, Arthur H. Hawgood, Doan 841-J

John Mitchell. John F. Wedow. Alfred Mitchell.

MITCHELL & CO.,

VESSEL and INSURANCE AGENTS,

508, 509 & 510 Perry-Payne Bldg.

Office Telephone, M 767. Residence, John Mitchell,

Doan, 341. John F. Wedow, Doan, 141-J.

Alfred Mitchell, Doan, 218.

CLEVELAND, - - - - - OHIO.

C. L. Hutchinson.

W. H. McGean.

HUTCHINSON & CO.,

VESSEL and INSURANCE AGENTS,

Office Telephone, Main 2453.

Residence, C. L. Hutchinson, Ridge 345-L.

Residence, W. H. McGean, East 1421-J.

313-315 Perry-Payne Bldg., - - CLEVELAND, O.

VESSEL AND INSURANCE AGENTS.

W. C. RICHARDSON,

VESSEL OWNER and BROKER

and
MARINE INSURANCE AGENT,

420-421 Perry-Payne Bldg. - - CLEVELAND, O.

Office Telephone 338; Residence Telephone, 2938.

C. P. GILCHRIST & CO.

Vessel and Insurance Agents.

Sale and Exchange of Vessels a Specialty.

Lumber and Coal Chartering.

Full Telephone Service, Office and Residence

(Local and Long Distance.)

411 Perry-Payne Bldg., CLEVELAND, O.

John B. Hall.

Harry B. Root.

HALL & ROOT,

VESSEL AGENTS.

21-22 Exchange Bldg. 202 Main Street..

Telephone, Seneca, 892.

BUFFALO, N. Y.

JOHN J. BOLAND,

VESSEL and INSURANCE AGENT.

25-26 Exchange Building. 202 Main St.

Telephone, Seneca, 115.

BUFFALO, N. Y.

J. J. H. Brown.

J. B. Rodgers.

Edward Smith.

BROWN & CO.,

VESSEL and INSURANCE AGENTS,

Dun Building, BUFFALO, N.Y.

D. T. HELM & CO.

VESSEL and INSURANCE AGENTS.

Telephones—Office, 263

Res. 381-3.

DULUTH.

MINN.

SAMUEL HOLMES,

STEAMSHIP OFFICES,

Morris Building.

For Selling, Chartering and Building

all Classes Steam Vessels.

Steam Vessel Circulars.

Weekly Freight Circulars.

NEW YORK.

F. H. WEEKS,

MARINE BROKER,

Vessels Sold, Chartered, Built and Insured.

Cable Address, WEEKSHIP, New York.

Telephone, 3275 Broad.

32 Broadway, New York.

Charles P. Notman.

David H. E. Jones.

JAMES W. ELWELL & CO.,

Established 1830.

SHIP BROKERS and STEAMSHIP AGENTS.

Sell and Charter all Classes of Vessels.

Agents for Cyprien Fabre & Cie. S. S. Line, Cie.

Havraise Peninsulaire, and Northwestern S. S. Co.

Battery Park Bldg., 21-24 State St. NEW YORK.

PROCTORS IN ADMIRALTY.

GEO. S. POTTER.

MEREDITH POTTER.

POTTER & POTTER,

Lawyers and Proctors in Admiralty,

35-36 Dun Building, 110 Pearl St.

BUFFALO, N. Y.

PROCTORS IN ADMIRALTY.

WILLIAM H. FAUST,

Lieutenant, United States Navy, (ret.)

COUNSELOR and PROCTOR IN ADMIRALTY.

Room 344 Federal Building, BUFFALO, N. Y.

RAY G. MacDONALD,

Attorney-at-Law and Proctor in Admiralty.

Suite 618 New York Life Building,

Telephone. Central 723

CHICAGO, ILL.

SHAW, WARREN, CADY & OAKES,

Attorneys-at-Law,

904 to 907 Union Trust Bldg....

Telephone. 625.

DETROIT, MICH.

C. E. KREMER,

Counsellor at Law and

Proctor in Admiralty.

Suite 821-822 - - - - - New York Life Building.

CHICAGO - - ILL.

HARVEY L. BROWN,

PROCTOR IN ADMIRALTY.

35 White Building, - - - - - BUFFALO, N. Y.

HOYT, DUSTIN & KELLEY,

LAWYERS AND PROCTORS IN ADMIRALTY.

Offices, 702 Western Reserve Building,

CLEVELAND, - - - - - OHIO.

White, Johnson, McCaslin & Cannon,

ATTORNEYS-AT-LAW and

PROCTORS IN ADMIRALTY.

Williamson Building, - - - - - CLEVELAND, O.

GOULDER, HOLDING & MASTEN,

LAW OFFICES,

Harvey D. Goulder, S. H. Holding, Frank S. Masten.

Perry-Payne Building, - - - CLEVELAND, O.

ALBERT J. GILCHRIST,

PROCTOR IN ADMIRALTY.

604 Perry-Payne Building, - - - CLEVELAND, O.

O. C. Pinney.

Dorr E. Warner.

PINNEY & WARNER,

LAWYERS AND PROCTORS IN ADMIRALTY.

Rooms 316 and 317 Perry-Payne Building.

Telephone, Main 2585 - - - - - CLEVELAND, O.

PROFESSIONAL.

W. J. WOOD, NAVAL ARCHITECT,
Consulting Engineer.

Prepares designs or working drawings and specifications for all classes of vessels and superintends construction and repairs. Surveys damaged property and estimates cost of repairs. Arbitrator and court expert.

Vessels designed—Twin S. S. Virginia, U. S. S. Frolic, formerly steam yacht Comanche, Twin S. S. North West and North Land, I. W. Nicholas, and many others, including Fire Boats, Tugs, Barges, etc.

Complete Plans Furnished For
Steel Composite or Wooden Vessels.

709 Rialto Building - - - - CHICAGO
Tel. Harrison 1020.

HENRY RICE and H. O. LOVEJOY,

Naval Architects, Consulting Engineers,
Surveyors of Wood and Steel Ships, Engines
and Boilers.

Estimates of cost given.

Superintendence of Building and Repairing.
Plans and specifications furnished for all classes
of ships

LINES AND MODELS FURNISHED.

202 Main St., Room 18, BUFFALO, N. Y.

R. L. Newman, M. I. N. A. Weir Merryweather.

NEWMAN & MERRYWEATHER,

Naval Architects, Consulting Engineers,
and Brokers for the Sale & Construction of all
Classes of Vessels.

Designers of all classes of Vessels, Freight and
Passenger Steamers, most modern Cargo Boats, Steam
Yachts, Steam Lighters, Tugs and Barges.

Drawings and specifications prepared, weights and
quantities taken out. Vessels superintended during
construction. Surveys and estimates of Cost of
Repairs.

Vessels for Carrying Oil in bulk a specialty.

The Cyclone Retarder and Tube End Protector for
use in internally-fired boilers where oil is used as fuel,
or fired with coal under forced drafts. Results of
practical test on two sister vessels show a saving in
favor of Retarders of 10 per cent.

Room 184 Morris Building,
66-68 Broad Street, New York City.
Telephone, 4716 Broad.

JOSEPH KIDD,

Marine Architect and Surveyor. Consulting Ship
Builder and Engineer.

Over thirty years' experience. Specifications.
Designs and Estimates. Superintendence of Con-
struction and Repairs. Damage and Other Surveys
carefully attended to. Negotiations for the build-
ing, charter or sale of all kinds of vessels and
machinery.

610 Board of Trade, - - - - DULUTH, MINN.

AMBROSE V. POWELL, M. Am. Soc. C.E.

CIVIL ENGINEER,

Designs and Constructs Dry Docks,
Harbor Works, Docks and Plant for
Handling Coal and Ore, Foundations.

Office, 1008 Chamber of Commerce, CHICAGO, ILL.

Members Maritime Association Port of N. Y.

SADLER, PERKINS & FIELD

Naval Architects and Engineers.

Chartering and Brokerage.

Maritime Building, New York.

NEW YORK.

DETROIT.

ROBERT W. HUNT & CO.

BUREAU OF INSPECTION.
TESTS AND CONSULTATION.

1121 The Rookery, Chicago.

Monong. Bank Bldg., Pittsburg.

66 Broadway, New York.

Inspectors of Shipbuilding Material and Machinery.
Inspectors of all Materials. Duty Tests of
Engines and Boilers. Physical and
Chemical Laboratories.

PROFESSIONAL.

H. MATTESON, JR.

GEO. B. DRAKE.

Matteson & Drake

Naval Architects and
Consulting Engineers

DESIGNING AND SUPERINTENDENCE
OF BUILDING AND REPAIRING
STEEL AND WOODEN VESSELS.
Bulk Oil Vessels a Specialty.

Agents for Marine Specialties.

706-707 Bourse. - - - - PHILADELPHIA.

**ADAM STEEL, JAMES NACEY,
ALEXANDER HYND,**

Marine Architects, Mechanical

Draftsmen, Consulting Engineers.

Specifications and designs for all descriptions
of Marine Vessels, Engines and Boilers,
Supervision of Construction and Re-
pairs. Damage and other Sur-
veys carefully attended to.

208-9 Western Reserve Bldg. CLEVELAND, O.

Phone, Main 3339 J.

Pittsburgh Testing Laboratory, Ltd.,

INSPECTING AND METALLURGICAL
ENGINEERS AND CHEMISTS,

1750 Monadnock,
CHICAGO.

235 Water Street,
PITTSBURG.

906-7 Crozier Building, Philadelphia,
New York City, 60 New Street.
Richmond, Va., 1107 1-2 Main St.

Inspectors of Shipbuilding Materials and Machinery.
Inspectors located at all mills. Physical and Chem-
ical Laboratories. Tests of all kinds.

PATENTS.

E. L. Thurston.

Albert H. Bates.

THURSTON & BATES,

Counselors at Law in Patent Causes,
and Solicitors of Patents,

1028 Society for Savings Bldg., - CLEVELAND, O.

Time and Distance Tables

FOR LAKE SHIPS

A set of tables showing the time required at
different rates of speed, 8 to 15 miles an hour, to
cover distances between all ports on the Great
Lakes. A time saver to the vessel owner or
vessel agent, as well as captain or engineer. Send
for it on approval.

Price, \$1.00

MARINE REVIEW,

39-41 Wade Bldg., Cleveland, Ohio.

**Photographs of Lake
Vessels.**

Unless otherwise specified, negative
size of following Photographs is 7x9
inches, and price is 75 cents each
Postage paid.

Alva.
Angeline, Hold. (Size 10x13—Price \$1.50).
Angeline, Spar Dock. (Size 10x13—Price \$1.50).
Argyle. (Thousand Islands).
Argyle. (Thousand Islands).
James Battle. (Detroit Fire Boat). On the ways.
James Battle. (Detroit Fire Boat). The launch.
Castalin.
Chicora.
Chippawa.
City of Bangor.
City of Erie at Buffalo Docks.
City of Erie.
Columbia. (On the Ways—Three Views).
Columbia.
Conemaugh.
Coralla, loading at Escanaba Ore Dock. (Size
17x21—Price \$2.00).
Corisca.
Corona.
John Craig.
M. M. Drake.
Eastern States. (Launch).
Eastern States on First Trip. (Three Views—
Broadside, Bow and Stern).
Eastern States. (On the Ways—Three Views).
Isaac L. Ellwood.
Excelsior. (Detroit Ferry).
Fairbairn.
H. C. Frick.
Garland. (Detroit Ferry).
Glidden—Wreck of, in St. Clair Ship Canal.
Greyhound.
Harlem.
Harvard. (On the Ways).
Harvard. (The Launch).
Harvard. (In the Slip—Two Views).
Helena.
Hennepin.
Holley, Alexander (Whaleback tow-barge).
Islander. (Thousand Islands—Two Views).
Frank E. Kirby at Put-in-Bay.
Lackawanna.
Mahoning.
Mahoning.
Majestic (Three views).
Michigan Central in Detroit River. (Winter).
Mohawk.
Montana.
W. B. Morley, wreck in Detroit River, Aug. 6, 1899.
Simon J. Murphy. (On the Ways).
Simon J. Murphy. (On the Ways—Two Views).
Simon J. Murphy, Launch. (Bow in Slip, Stern not
yet in Water).
Neshoto.
New Island Wanderer. (Thousand Islands).
New York. (Thousand Islands—Two Views).
North King. (Thousand Islands).
North Land, in the "Soo" Locks. (Two Views).
North Land, at Mackinac Island. (Two Views).
North Land and North West in Winter Quarters.
North West.
Onglara. (Two Views).
Peerless, at Mackinac Island.
Pere Marquette No. 17.
Plankinton at Northwestern Coal Docks, Duluth.
Pleasure, at Dock (Detroit Ferry).
E. C. Pope.
Princeton.
Ramapo.
W. D. Rees.
Rensselaer.
Rube Richards, in Ship Canal at Duluth.
St. Lawrence (Thousand Islands).
Ste. Marie, in Mackinac Straits.
Howard L. Shaw. (On the Ways—Three Views).
Howard L. Shaw. (The Launch).
Howard L. Shaw. (In the Slip).
Sir William Siemens.
George Stone.
Tashmoo. (In Dewey Naval Parade, Detroit River).
Tashmoo, June 9, 1900.
Tashmoo. (Entering St. Clair Flats Ship Canal).
Tashmoo. (Landing at Star Island—Two Views).
Toronto. (Thousand Islands).
Toronto. (Thousand Islands—at Alexandria Bay).
Toronto. (Thousand Islands—at Gananoque).
Transport, in Detroit River, Winter. (Car Ferry—
Two Views).
Troy.
Uganda, in Ship Canal at Duluth.
United Empire.
Capt. Visger. (Thousand Islands).
E. P. Wilbur.
Western States. (Size 10x13—Price \$1.50).
Yosemite.

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review and Marine Record, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review, 39-41 Wade Bldg., Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

Dake Engine Co.....Grand Haven, Mich.

AIR PUMPS AND APPLIANCES.

Fore River Ship & Engine Co.....Quincy, Mass.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
Bowers, L. M. & Co.....Binghamton, N. Y.
DeGrauw, Aymar & Co.....New York.
Seaboard Steel Casting Co.....Chester, Pa.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Victor Metals Co.....Braintree, Mass.

ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Sturtevant, B. F., & Co.....Boston.

ASBESTO-METALLIC PACKING.

American Steam Packing Co.....Boston.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Brown, Harvey L.....Buffalo.
Faust, Lient. Wm. H.....Buffalo.
Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Kremer, C. E.....Chicago.
MacDonald, Ray G.....Chicago.
Pinney & Warner.....Cleveland.
Potter & Potter.....Buffalo.
Shaw, Warren, Cady & Oakes.....Detroit.
White, Johnson, McCaslin & Cannon.....Cleveland.

BANKERS.

Fahey & Co.....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

BELTING, RUBBER.

New York Belting & Packing Co.....New York.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

Sturtevant, B. F. Co.....Boston.

BOAT BUILDERS.

Dreln, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Delauney, Belleville & Co.....St. Denis, France.
Detroit Ship Building Co.....Detroit.
Fletcher, W. A. & Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Forest City Boiler Co.....Cleveland.

Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher Water Tube Boiler Co.....New York.
Newport News Ship Building Co.....Newport News, Va.
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.
Risdon Iron Works.....San Francisco.
Roberts Safety Water Tube Boiler Co.....New York.
Stirling, The Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.
Union Machine & Boiler Co.....Cleveland.
United States Ship Building Co.....New York.
Willard, Chas. P. & Co.....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BOOKS, NAUTICAL AND ENGINEERING.

Audel & Co., Theo.....New York.
Marine Review Pub. Co.....Cleveland.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Lunkenheimer Co.....Cincinnati.
Macbeth Iron Co.....Cleveland.
Phosphor Bronze Smelting Co.....Philadelphia.
Victor Metals Co.....Braintree, Mass.

BRIDGES, BUILDERS OF.

Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co.....Cleveland.
Macbeth Iron Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

CARPETS, FURNITURE, BEDS, ETC.

Meckes, John.....Cleveland.
Siegel, Cooper Co.....New York.
Williams & Rodgers Co.....Cleveland.

CEMENT, IRON FOR REPAIRING LEAKS.

Smooth-On Mfg. Co.....Jersey City, N. J.

CHAINS.

Lebanon Chain Works.....Lebanon, Pa.
Standard Chain Co.....Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co.....Boston, Mass.
Dake Engine Co.....Grand Haven, Mich.

CHARTS.

Marine Review Pub. Co.....Cleveland.
Potter, J. D.....London.

CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.

Ashton Valve Co.....Boston.
Bliss, John & Co.....New York.
Chelsea Clock Co.....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburg Coal & Iron Co.....Buffalo.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co (Inc.).....Cleveland.
Lidgerwood Mfg. Co.....New York.
Macbeth Iron Co.....Cleveland.

COMPASSES.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COMPASS ADJUSTER.

Smith, Capt. W. J.....Seattle, Wash.

CONCRETE MIXERS.

Contractors Supply & Equipment Co.....Chicago.

CONDENSERS.

Thropp & Sons Co., John E.....Trenton, N. J.

CONTRACTORS SUPPLIES.

Contractors Supply & Equipment Co.....Chicago.

CONTRACTORS FOR PUBLIC WORKS.

Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co.....Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H.....Milwaukee.

CORDAGE.

Baker & Co., H. H.....Buffalo.
DeGrauw, Aymar & Co.....New York.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburg, Pa.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Long Island City, N. Y.

CHAIN CONVEYORS, HOISTS.

Bartlett & Snow Co., C. O.....Cleveland.
Brown Hoisting Machinery Co (Inc.).....Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

CRANES, TRAVELING.

Bartlett & Snow Co., C. O.....Cleveland.
Brown Hoisting Machinery Co.....Cleveland.
Lidgerwood Mfg. Co.....New York.
Pawling & Harnischfeger.....Milwaukee.

DISTANCE FINDER.

Nicholson Ship Log Co.....Cleveland.

DIVING APPARATUS.

Morse, A. J. & Son.....Boston.
Schrader's Son, A.....New York.

DREDGING CONTRACTORS.

Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co.....Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H.....Milwaukee.

DRYING APPARATUS.

Sturtevant, B. F. Co.....Boston.

DRY DOCKS.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....Newport News, Va.
Shipowners Dry Dock Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
United States Ship Building Co.....New York.

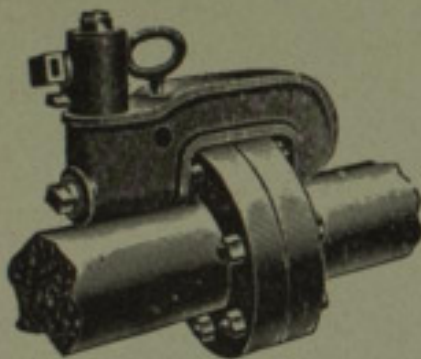
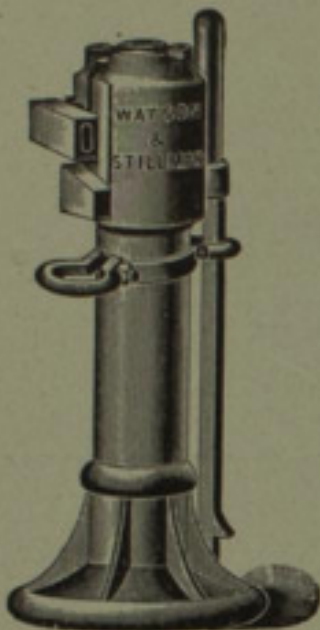
PHONE--BLACK 5424

**SUCCESSFUL
COMPASS
ADJUSTER****THEORY AND
PRACTICE****SEATTLE NAUTICAL COLLEGE**

ESTABLISHED 1898

CAPTAIN W. J. SMITH, Principal.
Graduate of Trinity Nautical College. Holding Master's
unlimited ocean license, steam and sail; American and
British. Author of the "Self-Instructor in Naviga-
tion" and "Practical Compass Adjustment."
MISS HELEN C. SMITH, Instructor.
2225½ FIRST AVE. - SEATTLE, WASH.

**NAVIGATION
AND NAUTICAL
ASTRONOMY
CLEARLY
TAUGHT**



Just what your particular needs are along the line of Hydrostatic Tools or Machines we do not know but we do know that you will hunt a long time without finding the equal of the **Hydraulic Jacks** we make.

In building our Jacks we apply the fundamental principle of all high pressure hydrostatic work with sound mechanical sense.

Rams have no welds or forced joints and the cylinders are bored from solid high carbon steel.

We do not confine ourselves to any one kind; we build nearly 300 different styles besides an endless variety of Hydraulic Machines, many of them especially adapted to Marine work.

Send for illustrated Index No. 65.

Watson-Stillman Co.

453 The Rookery,
CHICAGO.

204-14 E. 43rd St.,
NEW YORK.

**WINTER MOORINGS
OF LAKE VESSELS.**

SEASON - - - 1903-4.

Price 50 Cents

MARINE REVIEW - - - CLEVELAND, O.

NEW. USEFUL. PRACTICAL.

ROGERS MACHINISTS' LIBRARY.

3 Vols. \$7 Postpaid \$1 Monthly.

The library forms the most helpful set of home-study and reference works ever published for the Practical Machinist, Engineer and Draftsman, giving, as they do, a complete course in Machine Shop and Drawing Room Practice.

1204 Pages. 1244 Illust'ns. 3023 Index Ref'ces.

Each volume is complete in itself and may be obtained separately. The books are beautifully bound in black vellum, with gold edges, and with titles stamped in gold.

1. ROGERS' "DRAWING AND DESIGN" - - \$3
2. ROGERS' "PROGRESSIVE MACHINIST" - - \$2
3. ROGERS' "ADVANCED MACHINIST" - - \$2

Send for MACHINISTS' CATALOGUE (post free.)

Theo. Audel & Co., Educational
Book Publishers,
63 FIFTH AVENUE, NEW YORK.

WHITE OAKTIMBERS. PLANK
AND
DIMENSION STOCK

F. S. SHURICK,
18 Broadway, NEW YORK CITY

A. J. MORSE & SON.**CONGRESS ST. BOSTON.****PERE MARQUETTE
R.R. & STEAMSHIP LINE**

Chicago, Milwaukee, Manitowoc,
and Grand Rapids, Saginaw,
Port Huron, Detroit, Toledo

H. F. MOELLER, Gen'l Passenger Agent
Send for folder. DETROIT, MICH

NAMES AND ADDRESSES OF

SHIP OWNERS
SHIP MASTERS
SHIP BUILDERS
NAVAL ARCHITECTS
MARINE ENGINEERS

AND OF

Every Interest Active in the Shipping Field,
Invaluable for Circular Purposes,

Are found in the

BLUE BOOK OF AMERICAN SHIPPING.

Sent on Approval, Carriage Prepaid.

MARINE REVIEW, - - - CLEVELAND, O.

**LAKE SHORE & MICHIGAN
SOUTHERN RY.****Eastward.**

No. 18, Southwestern Lim
No. 22, Lake Shore Lim...
No. 20, Chi & Cleve Ex...
No. 28, N Y & Bost Ex...
No. 40, Toledo & Buff Ac.
No. 32, Fast Mail...
No. 48, Ac via Sandusky...
No. 44, Cleve. & N. Y Sp.
No. 46, Southwestern Ex.
No. 116, Conneaut Accom
No. 6, Lim Fast Mail...
No. 26, 20th Cent Lim...
No. 10, C., N Y & B Sp...
No. 16, New Eng Ex...
No. 2, Day Express...
No. 126, Norwalk Accom.

Westward.

No. 11, Southwestern Lim
No. 7, Day Express...
No. 15, Bost & Chi Sp...
No. 19, Lake Shore Lim...
No. 23, Western Express...
No. 29, Southwestern Sp.
No. 33, Southwestern Ex
No. 133, Cleve & Det Ex...
No. 47, Accommodation...
No. 141, Sandusky Accom.
No. 43, Fast Mail...
No. 127, Norwalk Accom...
No. 37, Pacific Express...
No. 3, Fast Mail Lim...
No. 115, Conneaut Accom.

Arrive
from
West

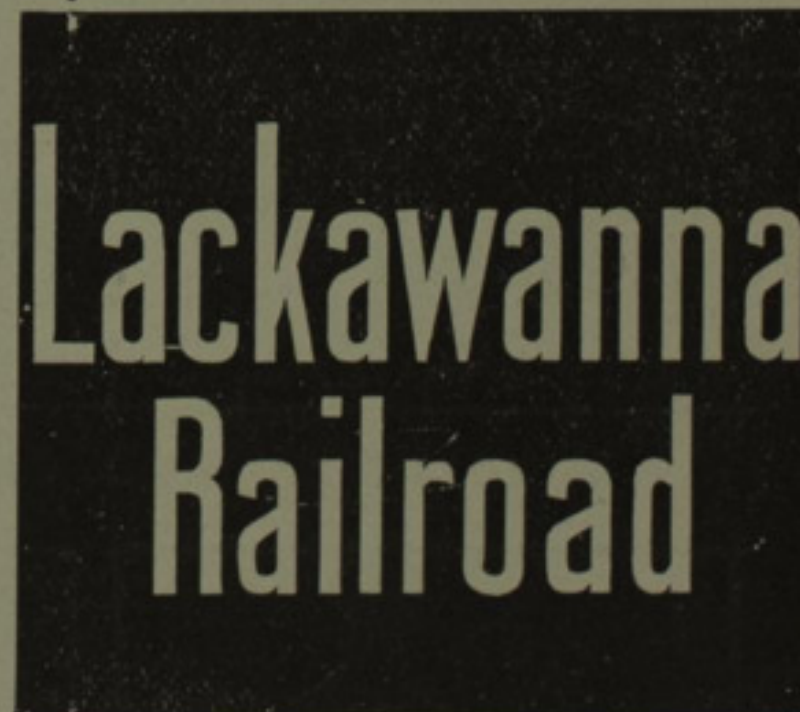
Depart
East.
*1:50am
*2:12am
*2:20am
*7:20am
*7:40am
*8:00am
†10:00am
†10:40am
*11:25am
*11:30am
†1:40pm
*3:00pm
*3:10pm
*3:10pm
†4:30pm
*5:40pm
*5:45pm
*7:40pm
*7:43pm
*7:30pm
*7:50pm
*10:30pm
*10:35pm
†9:10pm
†9:25pm
†8:10am
.....

Arrive
from
East.

Depart
West.
*3:25am
.....
*6:00am
*3:15am
*7:05am
*7:15am
*10:30am
*10:35am
†11:00am
*12:25pm
.....
*12:45pm
†11:00am
†3:00pm
*7:10pm
*4:35pm
*4:40pm
.....
†5:10pm
*6:50pm
*7:20pm
*10:50pm
*10:55pm
*8:30am
.....

*Daily. †Except Sunday. ‡Except Monday.
Trains Nos. 23, 28 and 37 run via Erie Station,
City Ticket Office, 237 Superior St.

The Story of Phoebe Snow.



If you have ever taken a summer railroad trip, you will enjoy the "Story of Phoebe Snow," which describes in a series of dainty pictures the experiences of a pretty girl who went to Buffalo. The illustrations are in seven colors, each reproducing a design of the girl in white which the Lackawanna Railroad has made so familiar in the last few months. The booklet has a particularly pleasing cover and will afford considerable amusement beside giving information which every traveler ought to know. It will be sent in response to request accompanied by two cents in stamps to T. W. Lee, General Passenger Agent, New York City.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

ELECTRIC HOISTS AND CRANES.

General Electric Co.....Schenectady, N. Y.
 Lidgerwood Mfg. Co.....New York.
 Pawling & Harnischfeger.....Milwaukee.
 Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ELECTRIC LIGHT AND POWER PLANTS.

General Electric Co.....Schenectady, N. Y.
 Sturtevant, B. F. Co.....Boston.
 Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

EMERGENCY BOILER TUBE REPAIR STOPPERS.

Mason, H. T. South Chicago.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Chicago Ship Building Co.....Chicago.
 Chase Machine Co.Cleveland.
 Cramp, Wm. & Sons.....Philadelphia.
 Craig Ship Building Co.....Toledo, O.
 Dake Engine Co.....Grand Haven, Mich.
 Detroit Ship Building Co.....Detroit.
 Fletcher, W. & A. Co.....Hoboken, N. J.
 Fore River Ship & Engine Co.....Quincy, Mass.
 Great Lakes Engineering Works.....Detroit, Mich.
 Hall BrosPhiladelphia.
 Jenks Ship Building Co.....Port Huron, Mich.
 Lockwood Mfg. Co.....East Boston, Mass.
 Macbeth Iron Co.....Cleveland.
 Milwaukee Dry Dock Co.....Milwaukee.
 Mosher, Chas. D.....New York.
 Moulton Steering Engine Co.....New York.
 Newport News Ship Building Co.....Newport News, Va.
 Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.
 Risdon Iron Works.....San Francisco.
 Roach's Ship Yard.....Chester, Pa.
 Sheriffs Mfg. Co.....Milwaukee.
 Superior Ship Building Co.....Superior, Wis.
 Thropp, J. E. & Sons Co.....Trenton, N. J.
 Trout, H. G.....Buffalo.
 United States Ship Building Co.....New York.
 Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co.....Chicago.
 Kieley & MuellerNew York.
 Lunkenheimer Co.Cincinnati.
 Mooers & Co., H.....Milwaukee.
 New York Belting & Packing Co.....New York.
 Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.
 Reilly Repair & Supply Co., James.....New York.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Hynd, AlexanderCleveland.
 Hunt, Robt. W. & Co.....Chicago.
 Kidd, JosephDuluth, Minn.
 Lovejoy, H. O.Buffalo.
 Matteson & DrakePhiladelphia.
 Mosher, Chas. D.....New York.
 Nacey, JamesCleveland.
 Newman & MerryweatherNew York.
 Pittsburg Testing Laboratory, Ltd.....Pittsburg.
 Powell, Ambrose V.....Chicago.
 Rice, HenryBuffalo.
 Roelker, H. B.....New York.
 Sadler, Perkins & FieldNew York.
 Steel, AdamCleveland.
 Wood, W. J.Chicago.

EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James.....New York.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, RobertBuffalo.
 Reilly Repair & Supply Co., James.....New York.
 Ross Valve Co.....Troy, N. Y.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y.
 Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

FORGES.

Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
 Fore River Ship & Engine Co.....Quincy, Mass.
 Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. SonsCleveland.

FURNACES FOR BOILERS.

Continental Iron WorksNew York.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
 Ironville Dock & Coal Co.....Toledo, O.
 Pickands, Mather & Co.....Cleveland.
 Pittsburg Coal Co.....Cleveland.
 Rochester & Pittsburg Coal & Iron Co.....Buffalo.
 Smith, Stanley B., & Co.....Detroit.
 Smith Coal & Dock Co., Stanley B.....Toledo, O.
 Youghiogheny & Lehigh Valley Coal Co.....Chicago.

GALLEY UTENSILS.

Meckes, JohnCleveland.
 Siegel Cooper Co.....New York.

GASKETS, RUBBER.

New York Belting & Packing Co.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.

GAUGES, STEAM AND VACUUM.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Lunkenheimer Co.Cincinnati.

GAUGES, WATER.

Bonner & Co., Wm. T.....Boston.
 Lunkenheimer Co.Cincinnati.

GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

GROCERIES AND SUPPLIES.

Siegel Cooper Co.....New York.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
 Brown Hoisting Machinery Co. (Inc.).....Cleveland.
 Chase Machine Co.....Cleveland.
 Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....New York.
 Hyde Windlass Co.....Bath, Me.
 Lidgerwood Mfg. Co.....New York.
 Marine Iron Co.....Bay City.
 Pawling & Harnischfeger.....Milwaukee.
 Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
 Crane Co.....Chicago.
 Jenkins Bros.New York.
 Lunkenheimer Co.....Cincinnati.
 Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Brown & Co.....Buffalo.
 Elphicke, C. W. & Co.....Chicago.
 Fleming & Co., P. H.....Chicago.
 Frankfort Marine, A. & P. G. Ins. Co.....New York.
 Gilchrist & Co., C. P.....Cleveland.
 Hawgood & Co., W. A.....Cleveland.
 Helm & Co., D. T.....Duluth.
 Hutchinson & Co.....Cleveland.
 McCarthy, T. R.....Montreal.

McCurdy, Geo. L.....Chicago.
 Mitchell & Co.....Cleveland.
 Moffat & Son.....San Francisco.
 Peck, Chas. E. & W. F.....New York and Chicago.
 Prindiville & Co.....Chicago.
 Richardson, W. C.....Cleveland.
 Sullivan, D. & Co.....Chicago.
 Voss, F. D.....New York.
 Weeks, F. H.....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland.
 Hanna, M. A. & Co.....Cleveland.
 Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.....
Mariner's Harbor, S. I., N. Y.
 Truscott Boat Mfg. Co.....St. Joseph, Mich.
 Willard, Chas. P.....Chicago.

LIFE FLOATS.

Carley Life Float Co.....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co.Pittsburg.
 Carley Life Float Co.....New York.
 Drein, Thos. & Son.....Wilmington, Del.
 Kahnweiler's Sons, D.....New York.
 Lane & DeGroot.....Long Island City, N. Y.
 Marine Construction & Dry Dock Co.....
Mariner's Harbor, S. I., N. Y.

LIGHTS, SIDE AND SIGNAL.

Russell & WatsonBuffalo.

LOGS.

Bliss, John & Co.....New York.
 Nicholson Ship Log Co.....Cleveland.
 Walker & Sons, Thomas.....Birmingham, Eng.
 Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

LUBRICATORS.

Crane Co.Chicago.
 Lunkenheimer Co.Cincinnati.

LUMBER.

Martin-Barriss CoCleveland.
 Shurick, F. S.New York.

MACHINISTS.

Chase Machine Co.....Cleveland.
 Lockwood Mfg. Co.....East Boston, Mass.
 Macbeth Iron Co.....Cleveland.
 Mooers & Co., H.....Milwaukee.
 Union Machine & Boiler Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS, BUILDERS OF.

Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.
 Meckes John.....Cleveland.
 Siegel Cooper Co.....New York.
 Williams & Rodgers Co.,Cleveland.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
 Detroit Ship Building Co.....Detroit.
 Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.

Katzenstein, L. & Co.....New York.
 U. S. Metallic Packing Co.....Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co.....Boston.

MOTORS, GENERATORS—ELECTRIC.

General Electric Co.....Schenectady, N. Y.
 Sturtevant, B. F. Co.....Boston.
 Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Bliss, John & Co.....New York.
 Ritchie, E. S. & Sons.....Brookline, Mass.

NAUTICAL SCHOOLS.

Seattle Nautical SchoolSeattle, Wash.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

NAVAL ARCHITECTS.

Hynd, AlexanderCleveland.
 Kidd, JosephDuluth, Minn.
 Lovejoy, H. O.Buffalo.
 Matteson & DrakePhiladelphia.
 Mosher, Chas. D.New York.
 Nacey, JamesCleveland.
 Newman & MerryweatherNew York.
 Rice, HenryBuffalo.
 Sadler, Perkins & Field.New York.
 Steel, AdamCleveland.
 Wood, W. J.Chicago.

OAKUM.

DeGrauw, Aymar & Co.New York.
 Stratford Oakum Co.Jersey City, N. J.

OIL FOR PAINTING.

Sipe & Co., James B.Allegheny, Pa.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph.Jersey City, N. J.
 Standard Oil Co.Cleveland.

PACKING.

American Steam Packing Co.Boston.
 Crane Co.Chicago.
 Jenkins Bros.New York.
 Katzenstein, L. & Co.New York.
 New York Belting & Packing Co.New York.
 United States Metallic Packing Co.Philadelphia.

PAINTS.

Baker, Howard H. & Co.Buffalo.
 Detroit Varnish Co.Detroit.
 Detroit White Lead Works.Detroit.
 Forest City Paint and Varnish Co.Cleveland.
 New Jersey Zinc Co.New York.
 Sipe & Co., James B.Allegheny, Pa.
 Upson-Walton Co.Cleveland.

PATENT ATTORNEYS.

Thurston & BatesCleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc.Philadelphia.

PILE DRIVING AND SUBMARINE WORK.

Buffalo Dredging Co.Buffalo.
 Chicago & Gt. Lakes Dredge & Dock Co.Chicago.
 Dunbar & Sullivan Dredging Co.Buffalo.
 Fitz-Simon & Connell Co.Chicago.
 Smith Co., L. P. & J. A.Cleveland.
 Starke Dredge & Dock Co., C. H.Milwaukee.

PIPE, WROUGHT IRON.

Bourne-Fuller Co.Cleveland.
 Crane Co.Chicago.
 Macbeth Iron Co.Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc.Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.

Bourne-Fuller Co.Cleveland.

PLUMBING, MARINE.

Reilly Repair & Supply Co., James.New York.
 Sands, Alfred B. & Son.New York.

PNEUMATIC TOOLS.

Allen, John F.New York.

POLISH FOR METALS.

Bertram's Oil Polish Co.Boston.

PRESSURE REGULATORS.

Kieley & MuellerNew York.
 Ross Valve Co.Troy, N. Y.

PROPELLER WHEELS.

American Ship Building Co.Cleveland.
 Atlantic WorksEast Boston, Mass.
 Cramp, Wm. & Sons.Philadelphia.
 Detroit Ship Building Co.Detroit.
 Fore River Ship & Engine Co.Quincy, Mass.
 Great Lakes Engineering Works.Detroit.
 Hyde Windlass Co.Bath, Me.
 Jenks Ship Building Co.Port Huron, Mich.
 Lockwood Mfg. Co.East Boston, Mass.
 Macbeth Iron Co.Cleveland.
 Milwaukee Dry Dock Co.Milwaukee.
 Newport News Ship Building Co.Newport News, Va.
 Phosphor Bronze Smelting Co., Ltd.Philadelphia.
 Risdon Iron WorksSan Francisco.
 Roelker, H. B.New York.
 Sheriffs Mfg. Co.Milwaukee.
 Superior Shipbuilding Co.Superior, Wis.
 Thropp & Sons Co., J. E.Trenton, N. J.
 Trout, H. G.Buffalo.
 United States Ship Building Co.New York.

PROJECTORS, ELECTRIC.

Bogue, Chas. J.New York.
 General Electric Co.Schenectady, N. Y.
 Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F., Mfg. Co.New York.
 Great Lakes Engineering Works.Detroit.
 Kingsford Foundry & Machine Wks.Oswego, N. Y.

PUNCHES, RIVETERS, SHEARS.

Allen, John F.New York.

RANGES.

Russell & WatsonBuffalo.
 Siegel Cooper Co.New York.

REFRIGERATING APPARATUS.

Roelker, H. B.New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes RegisterCleveland.
 Record of American & Foreign Shipping.New York.

RIVETING MACHINES.

Allen, John F.New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.Cleveland.

SAFETY VALVES.

American Steam Gauge Co.Boston.
 Ashton Valve Co.Boston.
 Crane Co.Chicago.
 Hayden Mfg. Co., N. L.Columbus, O.
 Lunkenheimer Co.Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co.Buffalo.
 Upson-Walton Co.Cleveland.
 Wilson & SilsbyBoston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS, NAUTICAL.

Seattle Nautical SchoolSeattle, Wash.

SEARCH LIGHTS.

Bogue, Chas. J.New York.
 General Electric Co.Schenectady, N. Y.
 Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.Cleveland.

SHIP BUILDERS.

American Ship Building Co.Cleveland.
 Atlantic WorksEast Boston, Mass.
 Buffalo Dry Dock Co.Buffalo.
 Cramp, Wm. & Sons.Philadelphia.
 Craig Ship Building Co.Toledo, O.
 Chicago Ship Building Co.Chicago.
 Detroit Ship Building Co.Detroit.
 Fore River Ship & Engine Co.Quincy, Mass.
 Great Lakes Engineering Works.Detroit.
 Jenks Ship Building Co.Port Huron, Mich.
 Lockwood Mfg. Co.East Boston, Mass.
 Manitowoc Dry Dock Co.Manitowoc, Wis.
 Milwaukee Dry Dock Co.Milwaukee.
 Newport News Ship Building Co.Newport News, Va.
 Risdon Iron WorksSan Francisco.
 Roach's Ship Yard.Chester, Pa.
 Shipowner's Dry Dock Co.Chicago.
 Smith & Son, Abram.Algonac, Mich.
 United States Ship Building Co.New York.
 Willard, Chas. P. & Co.Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co.Buffalo.
 Reilly Repair & Supply Co., James.New York.
 Upson-Walton Co.Cleveland.

SHIP LANTERNS AND LAMPS.

Russell & WatsonBuffalo.

SHIP TIMBER.

Martin-Barriss Co.Cleveland.
 Shurick, F. S.New York.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co.Jersey City, N. J.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR, SOLID.

Falls Hollow Staybolt Co.Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co.New York.
 Gilchrist & Co., C. P.Cleveland.
 Holmes, SamuelNew York.
 McCarthy, T. R.Montreal, Can.
 Newman & MerryweatherNew York.
 Weeks, F. H.New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.New York.
 International Mercantile Marine Co.Philadelphia.
 Pere Marquette R. R. & S. S. Line.Milwaukee.
 Red Star LineNew York.

STEEL CASTINGS.

Seaboard Steel Casting Co.Chester, Pa.
 Macbeth Iron Co.Cleveland.

STEERING APPARATUS.

American Ship Building Co.Cleveland.
 Chase Machine Co.Cleveland.
 Dake Engine Co.Grand Haven, Mich.
 Detroit Ship Building Co.Detroit.
 Hyde Windlass Co.Bath, Me.
 Jenks Ship Building Co.Port Huron, Mich.
 Moulton Steering Engine Co.New York.
 Pawling & HarnischfegerMilwaukee.
 Sheriffs Mfg. Co.Milwaukee.

STOCKS, BONDS, SECURITIES.

Fahey & Co.Cleveland.

SUBMARINE DIVING APPARATUS.

Morse & Son, A. J.Boston.
 Schrader's Son, A.New York.

SURVEYORS, MARINE.

Gaskin, EdwardBuffalo.
 Hynd, AlexanderCleveland.
 Lovejoy, H. O.Buffalo.
 Matteson & DrakePhiladelphia.
 Nacey, JamesCleveland.
 Newman & MerryweatherNew York.
 Rice, HenryBuffalo.
 Steel, AdamCleveland.
 Wood, W. J.Chicago.

TESTS OF MATERIALS.

Hunt, Robert W. & Co.Chicago.
 Pittsburg Testing Laboratory Ltd.Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co.New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F.New York.
 Watson-Stillman Co.New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc.Philadelphia.

TOWING MACHINES.

American Ship Windlass Co.Providence, R. I.
 Chase Machine Co.Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co.Kingston, Ont.
 Midland Towing & Wrecking Co., Ltd.Midland, Ont.

TRAPS, STEAM.

Kieley & MuellerNew York.
 Lunkenheimer Co.Cincinnati.
 Sturtevant Co., B. F., Jamaica Plain.Boston.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

TRUCKS.

Boston & Lockport Block Co.....Boston.

TUBING, SEAMLESS.

Shelby Steel Tube Co.....Pittsburg, Pa.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crane Co.....Chicago.
 Jenkins Bros.....New York.
 Kieley & Mueller.....New York.
 Lunkenheimer Co.....Cincinnati.
 Mooers & Co., H.....Milwaukee.
 Ross Valve Co.....Troy, N. Y.

VALVES FOR WATER AND GAS.

Ross Valve Co.....Troy, N. Y.

VARNISHES.

Detroit Varnish Co.....Detroit.
 Detroit White Lead Works.....Detroit.
 Forest City Paint & Varnish Co.....Cleveland.
 New Jersey Zinc Co.....New York.
 Also Ship Chandlers.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co.....Boston.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
 Brown & Co.....Buffalo.
 Elwell, Jas. W. & Co.....New York.
 Elphicke, C. W. & Co.....Chicago.
 Fleming & Co., P. H.....Chicago.
 Gilchrist & Co., C. P.....Cleveland.
 Hall & Root.....Buffalo.
 Helm & Co., D. T.....Duluth.
 Hawgood & Co., W. A.....Cleveland.
 Holmes, Samuel.....New York.
 Hutchinson & Co.....Cleveland.
 McCarthy, T. R.....Montreal.
 Newman & Merryweather.....New York.
 Mitchell & Co.....Cleveland.
 Prindiville & Co.....Chicago.
 Richardson, W. C.....Cleveland.
 Sullivan, D. & Co.....Chicago.
 Weeks, F. H.....New York.

WATER GAUGES.

Bonner & Co., Wm. T.....Boston.
 Lunkenheimer Co.....Cincinnati, O.

VESSEL FURNISHINGS.

Meckes, John.....Cleveland.
 Siegel Cooper Co.....New York.
 Williams & Rodgers Co.....Cleveland.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co.....Buffalo.
 DeGrauw, Aymar & Co.....New York.
 Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Lunkenheimer Co.....Cincinnati.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
 American Ship Building Co.....Cleveland.
 Hyde Windlass Co.....Bath, Me.
 Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
 Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co..Kingston, Ont.
 Midland Towing & Wrecking Co., Ltd.Midland, Ont.

YACHT AND BOAT BUILDERS.

Dreln, Thos. & Son.....Wilmington, Del.
 Lane & DeGroot.....Long Island City, N. Y.
 Marine Construction & Dry Dock Co.....New York.
 Truscott Boat Mfg. Co.....St. Joseph, Mich.
 Willard, Chas. P. & Co.....Chicago.

YAWLS.

Dreln, Thos. & Son.....Wilmington, Del.
 Lane & DeGroot.....Long Island City, N. Y.

Marine Fire Box Boiler for Sale.

16 ft. long, 9 ft. 6 in. diameter; allowed 125 lbs. steam; in good condition. Price reasonable. Address Capt. John Green, 402 West Ferry St., Buffalo, N.Y. tf

Small Steamer Wanted.

Wanted to buy a small steamer, 70 to 80 ft. length, with plenty beam, that will do for excursion or ferry boat. Single deck preferred. Send full description with lowest cash price. Address L. E. Eggert, Muskegon Heights, Mich.
 Mar. 24

For Sale.

Tug Duncan City. Address, Geo. Pankrantz Lumber Co., Sturgeon Bay, Wis. tf

Steamers for Sale.

Steamers Russell Sage and John C. Gault, with complete fit-out for package freight, electric light plant, etc. will carry 40,000 bushels wheat, or 1,200 tons package freight on draft of 14 ft. Both vessels can be seen at Toledo, O. For further information apply to A. W. Colton, Toledo, O.
 Mar. 31

Hydraulic Slings for Sale.

Hydraulic slings consisting of beam, cylinders, plungers, uprights, hydraulic and feed pumps, engine, etc., capable of raising 300 tons. Address McKinnon Mfg. Co., Bay City, Mich. tf

Position Wanted.

Wanted position by an experienced party as superintendent or manager of a motor boat construction company. Ten years experience. Can furnish best of reference. Address Box 59, the Marine Review, 39-41 Wade Bldg., Cleveland, O.
 Mar. 10

Gasoline Launch for Sale.

Length 25 ft. 6 in., beam 6 ft. Stationary roof and side curtains. 7½ H. P. Speed about 10 miles. In first class condition; almost new. Apply to Capt. John Green, 402 W. Ferry St., Buffalo, N.Y. tf

Steamer for Sale at Cost—\$13,500.

The old Anchor Line twin-screw steamer Gordon Campbell. Two decks, gangways, hoisting machinery, etc. Suited to carrying coal, lumber, ties, package freight, etc. Spent \$3,500 in repairs this year. Other business requires my undivided attention and I will sell for cost to me. W. F. Carroll, 1011 Ashland block, Chicago. tf

Yacht for Sale.

New beautiful 100-ft. steam yacht, fully equipped. Owner physically unable to use yacht. Will sell for any reasonable offer. Yacht can be seen in Detroit. Address M. J. STEFFENS, 57 East Twenty-second st., Chicago. tf

Tug for Sale.

Tug Frank Canfield, 75 ft. long. Engine 18 x 20, boiler 6½ x 13. Address Canfield Tug Line, Manistee, Mich. Apr. 28

Passenger Steamer and Tug for Sale.

Steamer Ogantz, 80 ft keel, 18 ft. 8 in. beam, 7 ft. 6 in. draught. Fore and aft compound engine, 14 and 25 by 16 in. Scotch boiler, 10 ft. by 84 in., allowed 125 lbs. steam. Passenger allowance—45 regular and 190 excursion.

Tug Dan Connelley, 65 ft. keel, 16 ft 6 in. beam, 8 ft. 6 in. draught. Iron boiler, 13½ ft. by 76 in., allowed 90 lbs. steam. Double engine, 14 x 15 in.

For particulars, address C. A. Nielson, Sandusky, O. Mar. 17

Vessel Property Wanted.

Cleveland real estate in exchange for vessel property. Address Box 58, Marine Review. tf

Steam Barge for Sale.

For Sale.—Steam barge, 131 ft. keel, 25 ft. beam, 9 ft. deep. Capacity, lumber, 260 M. ft.; coal, 375 tons. Good power; can handle two or three barges. Everything pertaining to this boat is in good condition. Terms cash. Address Lock Box 35, St Clair, Mich. Mar. 17

U. S. ENGINEER OFFICE, Milwaukee, Wis., Feb. 17, 1904. Sealed proposals for building an Elevator Dredge with Auxiliary Conveyor will be received here until 3 P. M. March 19, 1904, and then publicly opened. Information furnished on application. J. G. WARREN, Major, Engrs. Mar. 17

U. S. ENGINEER OFFICE, 57 Park St., Grand Rapids, Mich., March 2, 1904.—Sealed proposals for dredging harbors on East Shore of Lake Michigan will be received here until 3 p. m., March 17, 1904, and then publicly opened. Information furnished on application. M. B. ADAMS, Lieut.-Col., Engrs. Mar. 10

U. S. ENGINEER OFFICE, Milwaukee, Wis., Feb. 9, 1904.—Sealed proposals for moving cribs at southerly ends of breakwaters, Racine and Kenosha Harbors, Wis., will be received here until 3 p. m., March 11, 1904, and then publicly opened. Information furnished on application. J. G. WARREN, Major, Engrs. Mar. 10

TREASURY DEPARTMENT, Washington, D. C., Feb. 27, 1904.—Sealed proposals are invited and will be received at this Department until 2 o'clock p. m., Saturday, April 16, 1904, at which time and place they will be opened in the presence of attending bidders for the construction of one steam screw propeller for the United States Revenue-Cutter Service, for duty on the coast of Maine, to be known while in course of construction or until launched as No. 14, R. C. S. Said vessel is to be constructed in accordance with the plans and specifications provided by the Secretary of the Treasury, which, together with form of proposal, contract, etc., may be obtained upon application to this Department. Bids must be addressed to the Secretary of the Treasury, and be indorsed on the envelope, "Proposal for Revenue Steamer for Coast of Maine." The right is reserved to reject any or all bids and to waive defects if deemed for the interests of the Government so to do. ROBERT B. ARMSTRONG, Acting Secretary. Mar. 17

THE L. P. & J. A. SMITH CO.

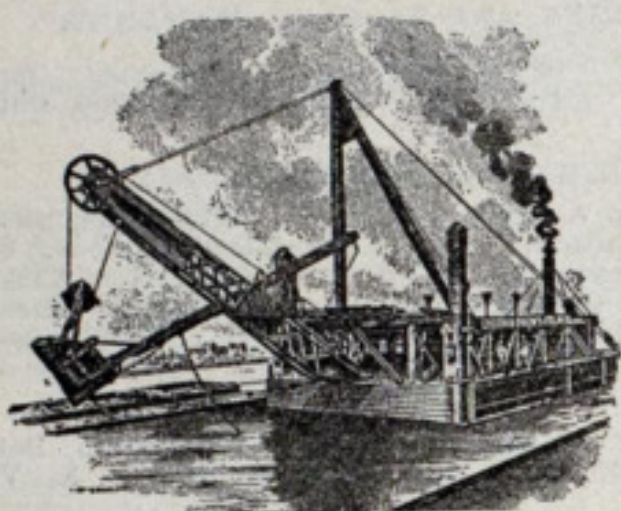
CONTRACTORS FOR PUBLIC WORKS

Dredging,
Harbor Work,
Pile Driving,
Breakwaters,

Dry Docks and
Pier Building,
Railroads,
Canals,

Bridges,
Submarine
Foundations,
Etc., Etc.

Offices : Williamson Bldg., - Cleveland, O.



CHICAGO & GREAT LAKES

DREDGE AND DOCK CO.

OWNS AND OPERATES THE PLANTS OF THE FORMER COMPANIES:

LYDON & DREWS CO., HAUSLER & LUTZ CO.,
GREEN'S DREDGING CO.,
CHICAGO STAR CONSTRUCTION & DREDGING CO.,
McMAHON & MONTGOMERY CO.,
CHICAGO DREDGING & DOCK CO.,
GRIFFITH, McDERMOTT & WATT DREDGING CO.,

CONTRACTORS FOR

RIVER AND HARBOR IMPROVEMENTS

MAIN OFFICE, 1319-1322 CHAMBER OF COMMERCE,
CHICAGO.

THE FITZ-SIMONS & CONNELL COMPANY,

Contractors for Public Works.

Dredging,
Docks,

Pile Driving,

Breakwaters

Tunnels,

Canals,

Bridges,

Foundations.

Offices : 1010-1014 Tacoma Building, CHICAGO.

C. H. STARKE DREDGE AND DOCK CO.,

Contractors for

PUBLIC WORKS,

Dredging, Pile Driving and Submarine Pipe Laying.

Canal Street, West of First Avenue,

MILWAUKEE, WIS.

BUFFALO DREDGING CO.

GENERAL CONTRACTORS ON SUBMARINE WORK.

Office D. S. MORGAN BLDG.

BUFFALO, N. Y.

Dunbar & Sullivan Dredging Company, of Buffalo, N. Y.

Will contract to remove ROCK or EARTH on the Great Lakes to 40 ft. depth.
To remove ROCK on Atlantic coast to 40 ft. depth.

That's All.

Dredges.
Brian Boru, Steel.
Tipperary Boy, Steel.
Erin Go Braugh.

Drill Boats.
Geo. A. Howells and
another, both Steel.

Tugs.
Shaughraun, Steel.
Phil Sheridan, Steel.
Spalpeen, Steel.
Paddy Miles, Steel.
Shaun Rhue, Steel.

We SOMETIMES
rent plant to respons-
ible parties at OUR
terms.

Derrick.
Faugh a Ballaugh.
Small Scows.

Scows.

Monroe Doctrine, 600 yds., Steel.
Protective Policy, 500 yds., Steel.
Reciprocity, 600 yds., Steel.
Cuba Libre, 250 yds., Steel.
Gold Standard, 250 yds., Steel.
No. 5, 600
No. 6, 600
No. 7, 600
No. 8, 600

4,600
McMyler derrick handling 10 tons at
75 ft. radius.

ORAM FIX. ESTABLISHED 1860. J. W. FIX.

S. FIX'S SONS,

Successors to S. FIX & SON,

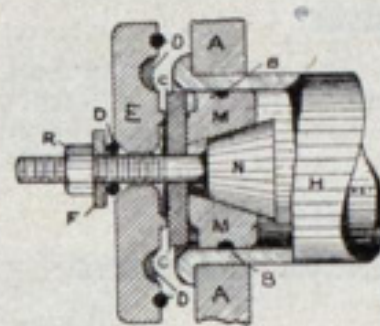
Steam Flue Welding Works

Our Work Stands Government Test.
Our Welds are Perfectly Smooth.
Write us for Prices.

COR. LEONARD AND WINTER STS. Cleveland, O.

Time and Money Saved

by using



Mason's
Patent
Expanding
Emergency
Boiler Tube
Repair Stopper.

Satisfaction guaranteed, or return.

Try it.

Stoppers for Hollow Shafting
Made to Order.

Enquire of Supply Houses or

H. T. Mason,

9921 Ewing Ave., - So. Chicago, Ill.

John D. Gilchrist, Pres. John Marron, Sec'y.
John A. Flajole, Gen'l Mgr.

THE FOREST CITY BOILER CO.

Marine Work a Specialty.

264 Merwin St. Tel. Main 1886
CLEVELAND, OHIO.

SCOTT'S

Coast Pilot for the Great Lakes
\$1.50

Marine Review,

Cleveland

For those who want to reach the marine
trade by letter or by circular, the 1903

BLUE BOOK OF AMERICAN SHIPPING

is invaluable. It contains names and addresses of

Marine Engineers, Vessel Owners, Vessel
Masters, Ship Chandlers, Yacht Owners, Ship,
Engine and Boiler Builders, Naval Architects,
Admiralty Lawyers, Etc., Etc.

Also,

Particulars of Dry Docks of the United States;
Maritime Exchanges; Heads of Government
Bureaus in the United States and Canada connec-
ted with Shipping; Public Works Contracts;
Wrecking Companies; and every interest
allied with Shipping or Ship Building.

Price \$5, Express Paid.

Sent on approval, carriage paid both ways,
to be accepted or returned upon examination

The Marine Review,

39-41 Wade Bldg., Cleveland, O.

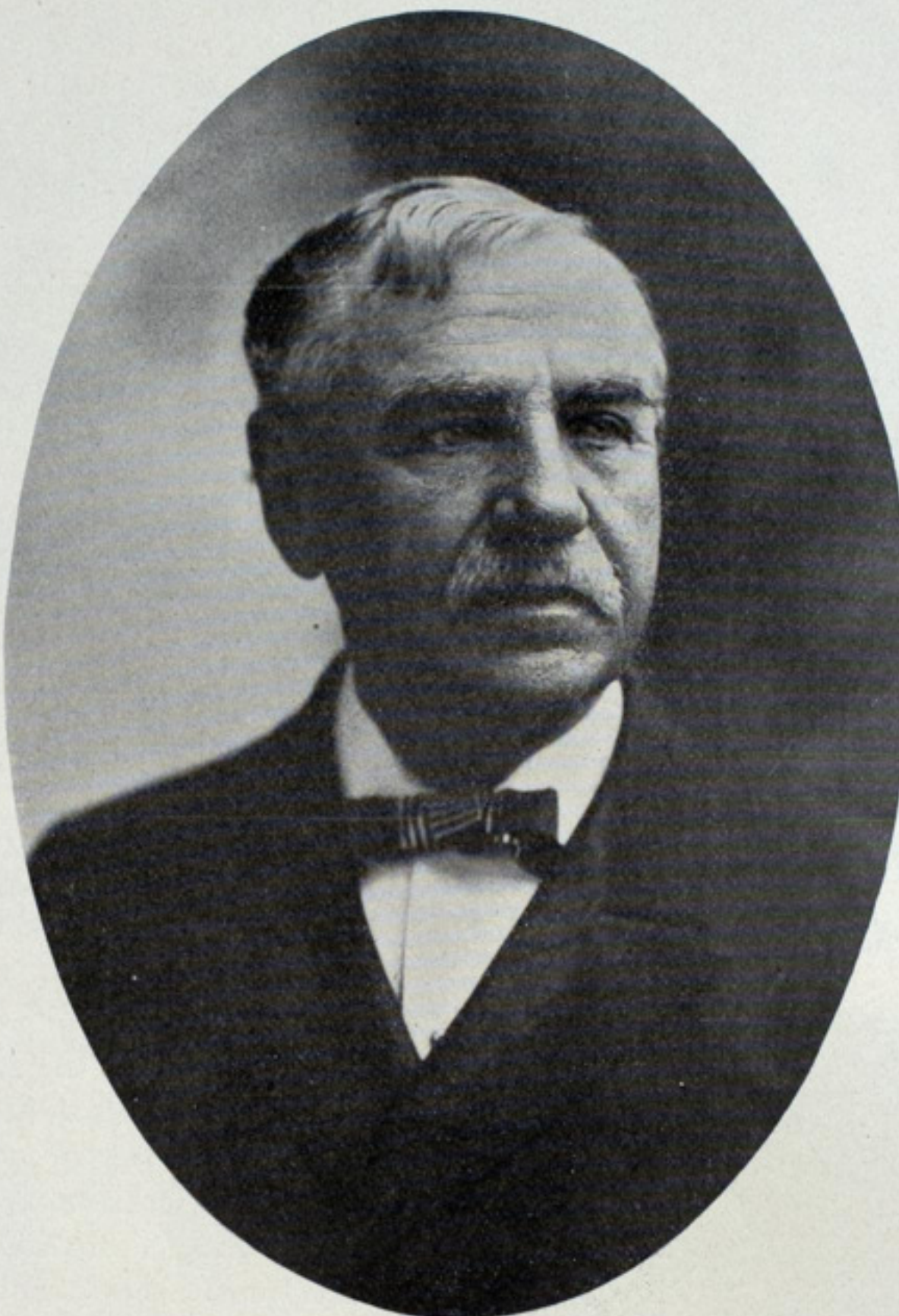
An Appeal for American Shipping.

BY SENATOR WILLIAM P. FRYE,

Chairman of the Committee on Commerce of the United States Senate.

It seems to me that the policy of protection has been beneficent to our country. I have no doubt that today industrially we have no peer. Nearly every industry has been protected, has flourished and is flourishing. One, and from a national point of view more important than any other, has for fifty years been without protection, compelled to compete with rivals protected. The logical result follows. With a sea coast of 10,000 miles equipped with splendid harbors, with forests boundless, with iron ore and coal enough for the world, with sagacious, enterprising business men, with capital in great abundance, with skilled laborers, with a constantly increasing foreign commerce, we have permitted our rivals, our inferiors in almost all these regards, to seize upon the pathways of the great oceans to our almost utter exclusion. Our foreign commerce amounts to nearly two and a half billions and we carry only 8 per cent. of it. I saw a report made by the secretary of the Produce Exchange in New York a while ago. I have forgotten the year to which it applied, in which

he showed that 55,764,000 bushels of grain were shipped that year from the port of New York to foreign ports and not a bushel on an American vessel. During the past two years we seem to have reached the climax of our decadence. If you will examine the Report of Commerce and Navigation you will find that there did not enter or clear a single American vessel from Germany, or Russia, or Sweden, or Norway, or Denmark, or the Netherlands, or Austria-Hungary, or Italy, or Greece, or Turkey. It seems to me that that picture ought to humiliate and mortify beyond expression any patriotic citizen of the United States, who glories in the powers and prosperity of his country. It is not alone humiliating, it is absolutely dangerous. Suppose there should come European war; suppose Great Britain and Germany should come to a conflict of arms; suppose those nations demand all the transports they can find, gathering them in from all the lines that are now crossing and recrossing the Atlantic and the Pacific. Who is going to carry our \$1,500,000,000 of exports? Who is going to pay the increased war premiums on the insurance of cargoes carried, if carried at all? In my opinion the farmers, the manufacturers and the wage workers of the United States would pay a penalty nearly, if not quite equal, to that paid by either of the contending parties. Now what is the cause of this condition of things? There is only one—American wages. That is all there is to it. American wages increase the cost of our ships for the foreign trade at least 25 per cent. We can supply the raw materials as cheaply as they can be supplied anywhere in the world; but the raw materials are only



SENATOR WILLIAM P. FRYE.

one-half the cost of the ship; the construction of the ship is the other half. In that construction we pay the men who do the work twice the wages paid on the Clyde today; more than twice the wages paid in any German ship yard and a great deal more than is paid in the ship yards of Norway. Our vessels today cost at least 25 per cent. more than do those in any country in the world. But the question of wages on ship board is infinitely more important than the additional cost of the ship. Comparing British, German and American liners, you will find that the German liner is running monthly on wages and food alone for one-half what it costs to operate the American liner St. Louis, and that the British liner has the advantage over the American ship of one-third. This is the story—not quite the whole story, but very nearly the whole of it. There is another thing to be reckoned with in considering this question, however. Of all the steamships in the world of 14 knots and upward 80 per cent. are subsidized by the countries whose flags they carry; of those of 16

knots and upward all but six are heavily subsidized by the countries whose flags they carry. Witness these figures. Great Britain pays in postal subsidies, in admiralty subventions and in retainers for sailors, a little over \$6,000,000 per annum; France pays in admiralty subventions, retainers for sailors, bounty construction and postal subsidies, over \$7,000,000 per annum; Germany, commencing but lately to reach out into the markets of the world, pays over \$2,000,000; Austria Hungary pays \$1,724,000; Spain paid to one single line \$1,629,000; Japan paid \$3,492,000, and the United States paid \$998,000. Are we to submit to this humiliating and wretched condition of things? There is one reason beyond pride in country which I wish to suggest. These nations have paid these postal subsidies for the purpose of establishing mail lines from their great commercial ports to the commercial ports of the world. For what purpose? For purposes of trade and nothing else. Trade cannot precede the mail. The mail must precede the trade, and they pay annually over \$25,000,000 for postal subsidies for one single purpose, and that is to put themselves in position to dispose of their surplus products in the markets of the world. There is not a nation on this earth that needs markets for surplus products more than does the United States of America. Its increase of product is growing year by year. Suppose a market is not found for this increase product; suppose the country finds itself with a surplus on hand which it cannot sell. Then comes stagnation, capital without profit and wage workers without pay. Is there anyone who for a single moment would dream that it is profitable for us, in

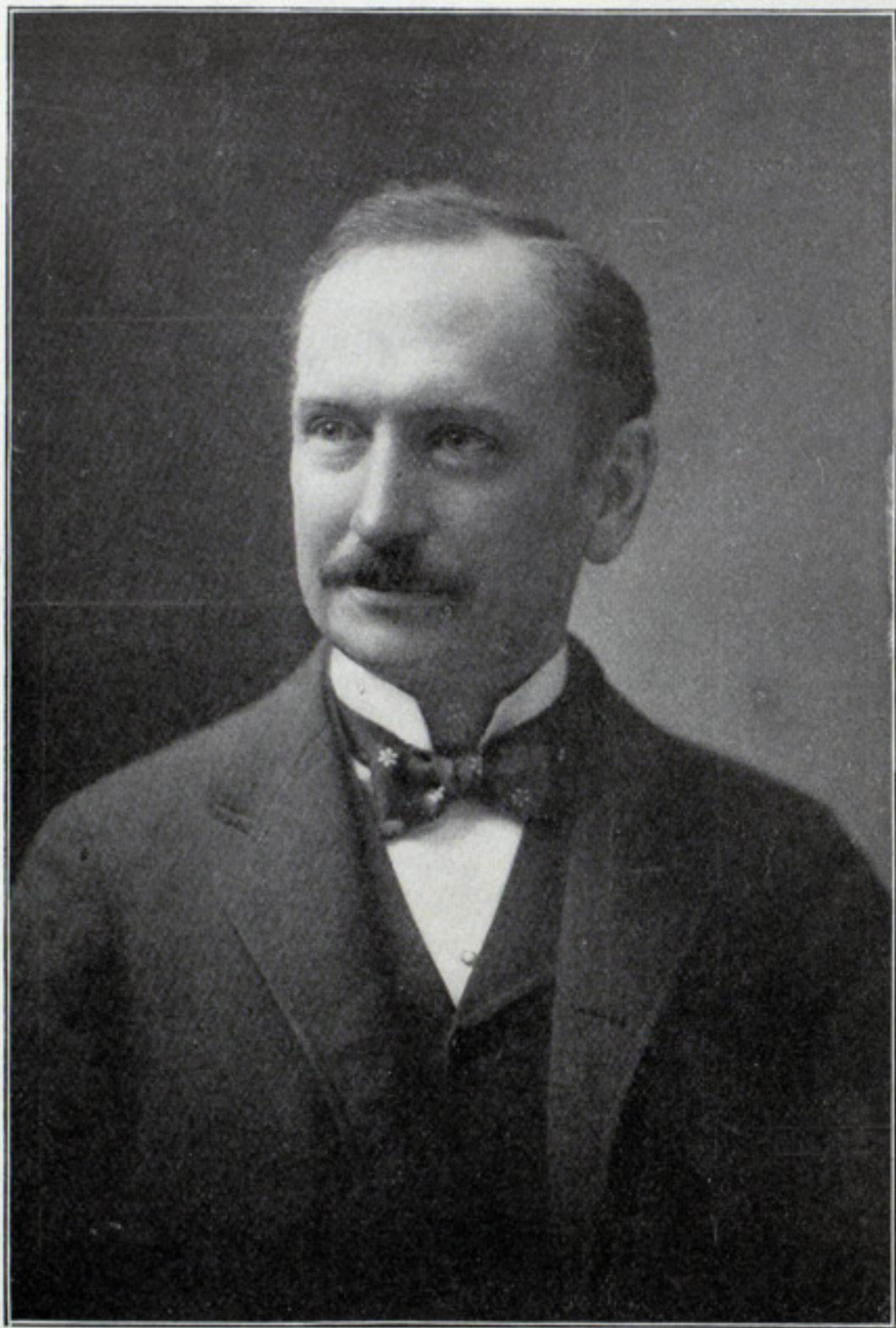
endeavoring to find those markets, to secure them through our enemies in trade; is there any merchant who would for a moment think of hiring the commercial agent of a rival house to find markets for his goods? Is there anyone who doubts that an American ship, commanded by intelligent, active, earnest, interested American officers, is a better instrument for the distribution of our products abroad, and for the finding of those markets than a German ship, officered by Germans, Germany being the dangerous rival of the United States in all this business for the next twenty-five years? What can we do? In my opinion there is only one way in which anything can be accomplished, and that is by paying out of the treasury

of the United States annually a sum of money which shall be equal to the difference between operating and carrying on of trade in foreign ships and carrying it on in our own. It has been done for every other industry. It should be done for shipping. For almost a quarter of a century I have been trying to solve the problem of restoring this mercantile navy of ours in the oceans of the world. I have taken more interest in it than in any other subject, and I have perhaps given it more thought and more care than I have given to all other subjects. I know of no way but one, and that is by national aid.

Improvement of American Waterways.

BY HON. T. E. BURTON,

Chairman of the Committee on Rivers and Harbors of the House of Representatives.



HON. T. E. BURTON.

The policy of the Federal government with reference to the expenditures for river and harbor improvements deserves careful and early attention. Very much has been accomplished for the development of the country by appropriations made in past years. Harbors have been deepened and prepared for the use of the largest ships in use; connecting channels have been widened and freed from obstacles; rivers and canals have been improved in a manner to greatly stimulate internal communication. It is not an exaggeration to say that the present industrial supremacy of the country would have been impossible except for these improvements. Our manufacturers of iron and steel could not have entered foreign markets without the cheap transit of ore which is made possible by improving the channels and harbors of the

great lakes. Inland communication by rivers has served as a check upon extravagant freight rates, and at the same time, has relieved the railways in times when the demands were so great as to cause congestion and make it impossible for them to provide for the traffic of the country. Then, also, by providing a cheap method of carrying raw material, these rivers have built up communities and greatly increased the traffic of the railways which parallel them.

The future of these improvements, however, is not altogether rosy to the friends of river and harbor improvements. The amounts expended year by year are ridiculously small when we take into account the great extent of our sea and lake coast and of our rivers. From an examination of the table of annual expenditures by fiscal years ending June 30, it appears that in only one year has the amount expended exceeded \$20,000,000. Over against this there are official estimates for contemplated improvements many of which are urgently needed, aggregating \$500,000,000. In addition to this there are numerous improvements urgently pressing, of more or less desirability, such as \$15,000,000 for the upper Mississippi, a considerably larger amount for the lower Mississippi, \$60,000,000 for the Ohio, and for the Missouri a bill has been introduced appropriating \$100,000,000. These, while the largest amounts requested, are but a few of the projects which are pressed. It is evident that either a radical change of policy must be adopted and much larger appropriations made annually, or that the Federal government must abandon these more expensive projects. Numerous propositions have been made for a participation in the expenses by localities immediately benefited. This would be very desirable if it were practical, as it would insure good faith and prevent the presentation of doubtful schemes. Even if one-third, or even one-quarter should be paid by the localities immediately interested it would have a salutary effect.

One glaring defect in our system which is especially noticeable in comparison with methods employed in Europe is the tardy and piecemeal prosecution of great public works. Important projects are undertaken, but appropriations are made so slowly that it requires twenty, twenty-five or even thirty years to finish them. The greater expense of this method and the disadvantage arising from failure to accomplish early results cannot be over-rated. No other company in the world enters upon this class of improvements without the end in sight. There are today approximately 400 projects under way and unfinished. It would seem desirable that they be finished before any considerable number of others are begun.

It is hoped that these subjects may be carefully considered during the coming season, and when another river and harbor bill is to be framed a wise decision will be reached upon the great questions of national policy involved.

Why No Protection for the Ship?

BY WINTHROP L. MARVIN,

Author of "The History of the American Merchant Marine."

This is a protectionist nation—the protectionist nation of the world *par excellence*. Our federal government, by the very stiffest kind of laws, fosters and encourages every industry, large and small, that feels the pinch of foreign competition—every industry with this great, costly and incredible exception: The trade of the ocean, the industry of the ship owner and sailor.

Two capitalists in a sea-coast town each procures from thrifty neighbors in large or small sums \$500,000 for investment. One proceeds to build a factory. He employs for the digging of his foundations, for the raising of his frame and for all the rest of his construction, American labor, which costs from 50 to 100 per cent., more than similar labor in factory building over seas. When his structure is completed, he equips it with American machinery, fabricated by American workmen, who earn from 50 to 100 per cent. more than men of exactly the same trades in Europe. He gathers his own working force of skilled operatives and unskilled laborers—all of them earning from 50 to 100 per cent. higher wages than their fellows of foreign lands.

His manufacturing plant has cost more to construct; it is going to cost more to operate. But for protection that manufacturer could not turn a wheel. Three months of operation under free trade would plunge him into bankruptcy. But the government of the United States, solicitous for the welfare of its people, gives this manufacturer a tariff protection in the prosecution of his industry, which enables him to go ahead. The cheap products of the cheaper labor of Europe cannot be dumped at his door. He is absolutely assured of a demand for his wares through this tariff protection, which, in many industries, is high enough to be prohibitive of foreign competition.

This manufacturer starts his machinery. He develops trade. He keeps his plant going to its full capacity. He watches his business with American alertness; he pushes it with American ambition. Presently, as he gains in experience and his workmen gain in skill, he discovers that his product is not costing him so much as it used to do. Step by step he reduces his prices, increases his business and makes as great or greater profits than before. He and his neighbors congratulate themselves upon their triumph. The national policy has been vindicated and all men say "See what protection has wrought."

This same policy, applied by hundreds of men in hundreds of communities the whole country over, has made of the United States in the fullness of the years the greatest manufacturing nation in the world.

Now, as to the second capitalist. What of him? He, too,

has secured his \$500,000. He does not turn to manufacturing. In his blood, perhaps, there runs the tide that has come down through a long line of sailor ancestors—for the sea was the first field of American industry. Ours is by instinct and environment a roving, adventuring race.

This second capitalist, following unconsciously, perhaps, the bent of his fathers, and turning to an older, bold and manly

trade, builds not a factory, but a ship, of good American steel for ocean commerce. The men who lay the keel, who raise the frames, who rivet the stout plating and who fashion the powerful machinery, earn wages from 50 to 100 per cent. greater than the men who are doing precisely the same work in the Old World. The men who have made these plates and frames in the mills of Pennsylvania or Ohio have also earned greater wages than are paid in Europe. When the ship is launched and her officers and sailors go aboard—every officer must be an American citizen and every sailor must have American pay—their cost to the ship owner is larger by far than the cost of a similar crew gathered at a British or French or German ship yard.

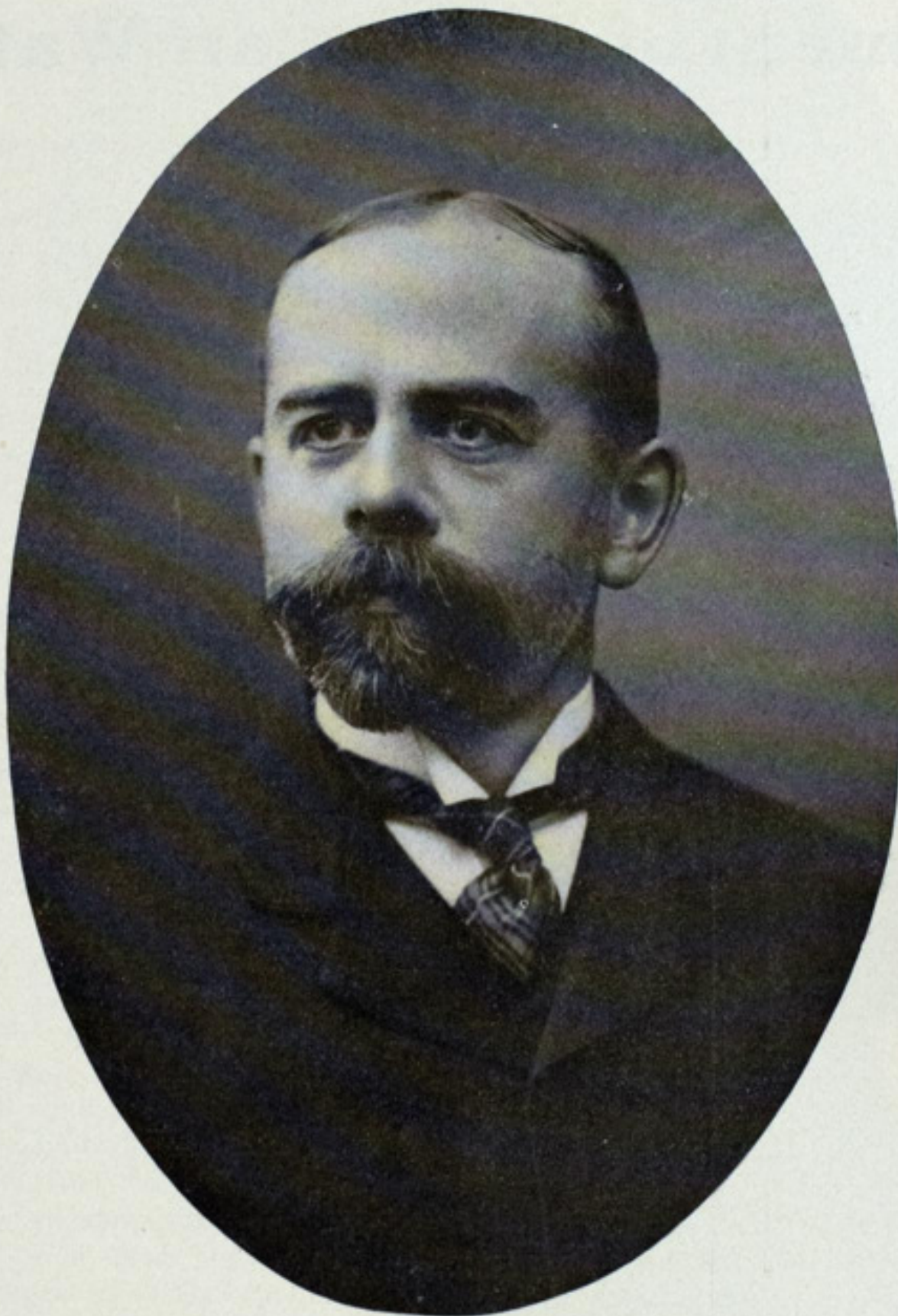
Moreover, the United States prescribes with a stern hand such liberal space and comfort for its sailor citizens and even so ordains what they shall eat and how many good and abundant stores the ship owner must have provided, that this humane legislation actually compels an increase in the cost of maintaining an American vessel of hundreds of dollars a

month and thousands of dollars a year.

Up to this point the manufacturer and the ship owner stand exactly alike. They have built their plants in a protected country, by protected labor. These plants—this factory and this ship—have both cost more money than they would have cost abroad—and every cent of this difference is represented by good wages paid to American workmen. To the manufacturer his government says "Go on in your trade. You shall come to no harm—we will protect you." Thus assured, he goes on and prospers.

To the ship owner the government says "You have built your ship in America with protected labor. We have compelled you to. You have officered it with American citizens, as the laws demand. You have provided with greater liberality and at greater cost for the health and comfort of your seamen. Now take your protected ship with her protected crew, and go out to sea and fight, in my waters, for my trade, with the cheap-wage ships, and even the subsidized ships, of Europe."

The American ship owner is a brave and self-reliant man—the bravest and best man of his calling in the world. He has tried to do as he was told. For forty years and more he has



MR. WINTHROP L. MARVIN.

been building his ships and sending them to sea and fighting, under terms of absolute free trade, with this foreign competition. Only in the coasting trade, reserved by ancient statutes to American ships, has he found any refuge. Here and there the fast ships of an American mail line have won some consideration from their government. But the general

ship owner—the man who builds freight ships for all-round business—has had no protection in the deep-sea trade. Alone in America, face to face with the heaviest odds of all, he has had no national help, no national encouragement.

What wonder is it that after these years of desperate struggle he is now giving up the contest and being forced, beaten and hopeless, but still fighting, from the seas? For the first time in our national history; for the first time in more than 100 years, absolutely no new keels are being laid for ocean commerce in all America. Here and there, to and fro, go the ghostly remnants of our fleet, and go they will so long as they can float. But to all appearances they are the last of their line; no new frames stand on our shores; no new ships for this deep-sea trade are coming forward.

Unless congress quickly arouses and gives protection to our one great industry which does not have it—to the industry which deserves it most—the building and sailing of ships in commerce over seas will soon become an absolutely lost art in America.

And the responsibility for this destruction will rest, where now lies the responsibility for the decline, on the shoulders of the Republican party. I am a Republican and a protectionist, but I say without the slightest hesitation that the course of Republican congresses toward our ocean shipping for forty years is utterly indefensible. On this one point Republican statesmanship has repeatedly broken down. Here is the worst blot on the Republican name, the one abject Republican failure.

This policy of protection is either right or wrong. If it is wrong let us abandon it. If it is right, let it be applied to the oldest and most characteristic and, for many years, perhaps, the most successful, of American industries.

I believe that President Roosevelt sees this. His recent message to congress gave a conspicuous place to the cause of the American merchant marine. He urged the establishment of a commission to study the loss of our ocean fleet and to devise the best method to restore it. A bill aiming at this end awaits the approval of congress. The executive has done his part. Now the responsibility rests with the nation's law-makers. It rests with the Republican majority in the senate and house. Will the Republican leaders fail, as they have

failed again and again, to come to an agreement on this question so vital to our national well-being?

Will they heed now the warning of our tottering ship yards, our disappearing ships? And these things are not the worst, for the long denial of protection is working very much deeper harm; it is slowly killing the maritime spirit of our people.

That genius for the ocean which long won for us such splendid victories in trade and war is not a matter of legislation. It cannot be created over night by an act of congress. We are strangling and smothering it out of our nation's life. Once gone, we shall have a long and costly struggle to restore that vital element of American character.

If those myopic statesmen who lavish protection on tin plate dipping sheds and deny it to American ship owning could sail along our Atlantic coast from the Bay of Fundy southward to Virginia—the first foothold of our race upon this continent—and could see the tokens of desolation in the little old gray towns where the men of our race have lived for almost three centuries—could see the crumbling homesteads of our farmer fishermen, their old walls scarred by Indian bullets and blackened by a thousand storms; if they could see the skeleton wharves, the deserted yards which once launched our ships for distant commerce, they might realize perhaps, if dimly, something of the cost to the men whom, cheating of protection, they have cheated of their fathers' heritage.

Our protective tariff has given work and wages to millions of immigrants from over seas, but all along

the sea coast of the ancient colonies, the "Old Thirteen," this government of ours, so beneficent, so generous in other things, has for forty years and more denied the right to work to the first Americans of all—to the descendants of the men who, in 1776 and 1812, swept the English coasts and kept our freedom on the ocean when we had almost lost it on the land. Here until forty years or so ago, in these hundreds of sea coast villages, the trade of the ocean, the only trade possible, was handed down from father to son. Theirs, as I have said, was our most characteristic American industry. It has been forgotten by the nation; it has been ignored by congress. Our men of the sea, the best builders and sailors of the world, have been forced away from their trade and their homes into strange and uncongenial callings. We have deliberately sacrificed a source of national wealth, a bulwark of national safety, which long made us envied of other nations; which other nations would have given millions of money to procure.

Of what use are steel turrets and 12-in. guns if in the hour of trial the "sea habit" is lacking in the men behind them?



NORWEGIAN BARK GOING OUT TO SEA.

[Photograph copyrighted, 1903, by E. Muller.]

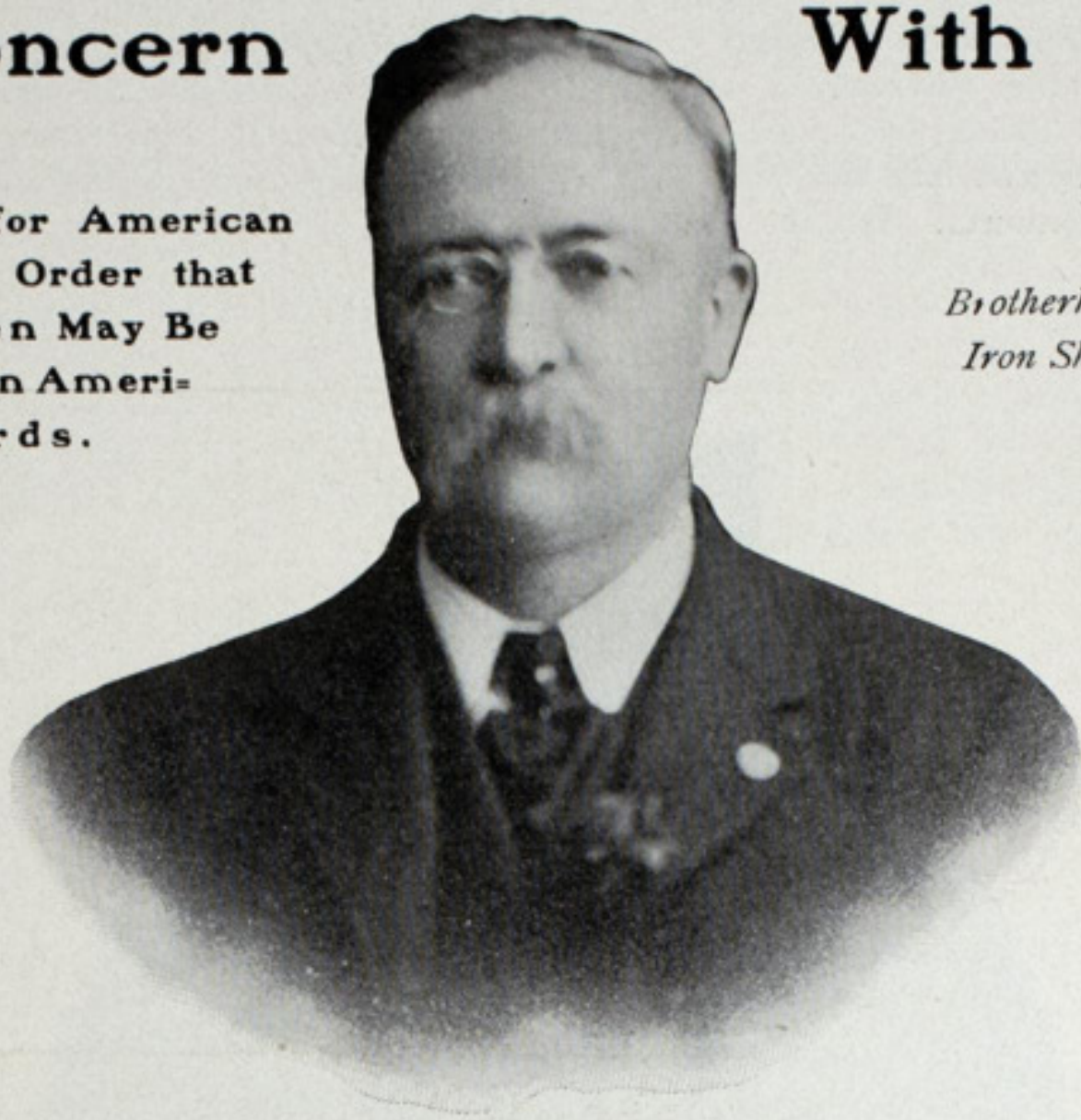
Labor's Concern

A Plea for Protection for American Deep Sea Shipping in Order that 30,000 Workmen May Be Given Employment in American Ship Yards.

I am the president of an organization of American workmen all of whom are dependent upon ship building for their livelihood. We have a membership of 30,000 scattered over the country among 500 different lodges. We are mostly concerned in securing work at our trade. There were never so many of our members seeking employment at their trade as there are to-day. Fully 20,000, or two-thirds of our members, are looking for work at their trade. If the United States built all of the ships that are employed in the deep sea trade of the United States there would be 100,000 of our craftsmen steadily employed where today not to exceed 10,000 men are so employed. Between fifty and one hundred millions of dollars now annually spent in foreign ship yards, employing foreign ship builders in the building of ships to keep up the tonnage required for the carrying of the foreign commerce of the United States, would be spent in the United States, and paid out to men of our craft, if we built the ships we need ourselves.

No one can say, therefore, that the shipping question is not an acute one with the Brotherhood of Boiler Makers & Iron Ship Builders; no one can say that I, as president of this organization, am invading the field of politics, or discussing a partisan question from a political point of view, when I add my voice to an appeal to Congress for legislation that shall give employment to the idle men of our craft—that shall give work and wages to 20,000 idle boiler makers and ship builders in the United States, and food and comfort to their families. I make this preliminary explanation to avoid being charged with being in any way mixed up in politics or partisanship, and I ask all those who discuss what I say to be fair enough to consider this denial.

We find ourselves in a country where the wages are far higher than they are in any other country. We do not desire any reduction in the average rates of American wages; rather than suffer a reduction our men will refuse work at their trade; they will accept the lower rates of wages that are paid in other trades, perhaps, or they will decline employment at wages below the average American rate. Economists may say this is foolish, and unwise. Whatever it is, let it be known that American boiler makers and iron ship builders demand and insist upon receiving the average rates of wages paid to men in their trades in the United States. If there is a change wrought in the economic policy of the United States—which we shall resist if attempted—that means a lower wage-rate, we shall then conform to the American standard as we do now. Considering the wages paid to our men in the ship yards, the prices of materials and other expenses connected with ship building, it is impossible to produce a ship in this country as cheaply as it can be produced in other countries. If we were steadily employed, like locomotive and bridge builders year in and



MR. JOHN M'NEIL,

With Shipping.

BY JOHN M'NEIL,
*President of the
Brotherhood of Boilermakers and
Iron Ship Builders of America.*

year out, through a great widespread demand for our product, we should, then, no doubt, be able to build ships as cheaply, if not more cheaply, than foreigners do, just as our locomotives and bridges are constructed as cheaply or more cheaply than foreign locomotives and bridges are constructed.

An American with capital which he is willing to invest in ships for our deep sea carrying is confronted, at the threshold, therefore, with the fact

that an American-built ship costs more than a foreign-built ship. The longer he studies the question the more clearly he will realize that this condition will continue until a great and permanent demand is created for American-built ships, or until the nation changes to a free trade condition. I regard the latter as too far in the future for consideration in connection with this problem. The great and permanent demand for ships for the deep sea trade is what is wanted. The problem is how to get it. Just such a situation existed in this country fourteen years ago with respect to the tin-plate industry. We knew how to make tin-plate, we had all the facilities with which to make it, the skill, the materials, and the demand for tin-plate. The price was the obstacle. Americans could not make it as cheaply as foreigners could. So Congress laid a high duty on imported tin-plate, and we all know that in the fourteen years that have passed since that duty was laid we not only make all of the tin-plate we need for ourselves, but we also export large quantities. If the high protective duty were withdrawn doubtless we should soon lose the manufacture of tin-plate. It was, through the action of Congress, made worth the while of American capital to invest in tin-plate making in this country. The wages of men employed at tin-plate manufacture were not reduced to the foreign level, but the cost of the foreign product was so increased as to enable Americans to make it, and still pay the going rates of wages in the United States to the workmen employed in tin-plate manufacturing.

We ask Congress to do for the ship building industry precisely what it did for the tin-plate industry. First, to realize that ships will not be built here for the foreign price, and secondly to make it profitable for American capital to invest in American-built ships. And we ask Congress to do this for our ships employed in the deep sea trade just as it has done it for the tin plate industry—through protection. We have tried free trade in ocean transportation so long that the results of the trial are manifest to everybody: we have now 800,000 tons of ocean shipping where a generation and more ago we had 2,500,000 tons.

But Congress is told that if protection is accorded to shipping for our ocean trade, American millionaires will be still further enriched. So Congress hesitates to act. What results? Congress's inaction is protection for the foreign ship builder and the foreign ship owner—they prosper while we

fail. Americans have invested nearly \$200,000,000 in ships built in foreign countries, officered and manned by foreign subjects, sailing under foreign flags, and carrying perhaps one-third of the total foreign commerce of the United States. It is commonly and frequently said that our laws do not permit Americans to buy foreign ships, the answer to which is that American citizens now own between 1,500,000 and 2,000,000 tons of foreign shipping. They have invested in foreign shipping because it is more cheaply built and more cheaply operated than American shipping is. It is only possible for Amer-

icans to successfully compete with foreign ships in our ocean trade by themselves owning foreign ships, and they do so. The 30,000 American boiler makers and iron ship builders that I represent understand this, and we realize, as perhaps Congress does not, and as we are sure the people do not, that the denial of protection to American ships in the deep sea trade amounts to a denial of employment for men of our craft at our trade in the United States—that the injury falls upon American labor, and not upon American capital. It is idle to tell us that we can prosper by accepting the foreign rates of wages; we could not if we would, and we

would not if we could. We want to be as good as other American workingmen in every respect; we want to earn as good wages, to enjoy as many of the necessities, the comforts and the luxuries of life as the rest of our fellow-workingmen do, and since acts of Congress have created and long maintained a high standard of wages for American workingmen in all other trades than ours, we still cling to the hope—long deferred, to be sure—that Congress will yet see, and then rectify, the injustice it does to American workingmen employed in building ships through its persistent refusal to protect American ships that compete with foreign ships in our over-sea trade.

Refusal to protect American ships in our deep sea trade, I repeat, is in effect absolute protection for foreign ship

builders and foreign ship owners. They, and their friends and business connections in the United States, and the free trade advocates, constitute every element of opposition to protection for American shipping.

Not only American workingmen are injured by Congress's refusal to protect American ships in the deep sea trade—the nation as a whole is injured—vitally injured. Merchant ships and citizen seamen are an indispensable resource of national defense; they constitute an auxiliary to our navy; they are the sources upon which the navy alone can draw for reinforcement;

lacking merchant ships and citizen seamen, the navy is in grave peril; it is weak where it should be strong. More than that, our rivals are strong through our inaction; they are strong where we are weak; our commerce gives them employment, gives them experience, gives them skill. In a moment this advantage may be utilized by our foreign rivals, who may become our enemies, to attempt our destruction or our subjection. Again, lacking ships and seamen of our own, and being dependent wholly upon foreign shipping as we are, we are at all times exposed to the possible and wholesale withdrawal of foreign shipping, through the



SANTA MARIA.

The Counterfeit Presentment of the Caravel of Christopher Columbus as She Sailed into New York Harbor in 1893.

necessities of foreign countries, should they become embroiled in war. Then we should be without the means to send our surplus products abroad, production would be curtailed in the United States, employment would be cut down, consumption would diminish, and industrial paralysis would herald widespread misery. We need the means for building our own merchant ships, kept in a constant state of efficiency and prosperity, just as much as we need the means for building our warships. We need a great navy to protect our commerce, our interests, our seacoast, and for the maintenance of the Monroe Doctrine. But our navy is, and will constantly remain, perilously weak and unsupported so long as we lack a great, efficient, prosperous and adequate merchant shipping of our own.



DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED
OR ASSOCIATED WITH MARINE MATTERS
ON THE FACE OF THE EARTH.

Published every Thursday by

The Penton Publishing Company,
CLEVELAND, OHIO.

CLEVELAND:
CHICAGO:
DETROIT:

WADE BUILDING,
MONADNOCK BUILDING.
HAMMOND BUILDING.

*Correspondence on Marine Engineering, Ship Building and
Shipping Subjects Solicited.*

Subscription, \$3.00 per annum. To Foreign Countries, \$4.50.
Subscribers can have addresses changed at will.

The Cleveland News Co. will supply the trade with the MARINE REVIEW
through the regular channels of the American News Co.

Entered at the Post Office at Cleveland, Ohio, as
Second Class Matter.

MARCH 10, 1904.

Readers of the Marine Review will notice that with this issue some changes have been made in its appearance and make-up that it is hoped will meet with the general endorsement of its friends. The re-arrangement apparent has been made with the sole idea of rendering its appearance more acceptable from a literary and artistic viewpoint. Others that are under contemplation and which will be introduced gradually, will, it is hoped, all lend their influence to making this one of the truly handsome publications of the world.

If there is any one tendency of mankind that has been at all times consistently adhered to in all ages and in the various changes that have been wrought in nations, governments and peoples since the beginning of time, it has been the consistent development of the "artistic" in the human race. In the first rank always among the arts has been the youngest of all, the "Art of Printing;" and as far as it may, with justice to itself, the Marine Review will endeavor hereafter to be a leader as an artistic publication that every subscriber and patron can be proud of.

It will take time, but each succeeding month will bring with it changes of such a minor character that they can perhaps hardly be observed, but in the aggregate they will, when added together, count for much towards the accomplishment of the desired end.

We very much desire to ask every reader of the Marine Review for two substantial favors: First, we

want each one to feel that any criticism of any feature of this paper's appearance or contents will at all times be in order and welcome; and second, we shall be very glad to receive contributions on any subject that would be appropriate for our columns. The Marine Review covers a wide range and a wide territory, and no matter in what part of the world our friends may be we shall be glad to hear from them frequently.

Not a single contract has been let for a vessel for the foreign trade of the United States for more than two years past. Such a sentence does not adorn the pages of American industry, but it points a moral, nevertheless. Here is a country whose exports are unrivaled among the nations of the earth without a single ship ordered for over two years to carry away its freight. That such a condition should obtain in a country so resourceful as this proves that there is something inherently and radically wrong. American shipping in the foreign trade is waging an unequal battle. It is not being given a fair show. It is struggling under the handicap imposed upon it by an American Congress. With every other industry protected, why should this one, the most important of them all, be neglected? This country has grown rich under the sheltering wing of a protective tariff. Every tributary that flows into the vast stream of American exports is patrolled and guarded at every turn; but the very means by which its volume has been swelled to such huge proportions has caused the American ship to swing listlessly at its moorings and to finally decay. Protection has so raised the standard of wages and the plane of living that it is impossible to build a ship in this country, or to operate it after it is built, at anything like the figures for which foreign ships are built and operated. If protection is to be granted to any industry it should be granted to all. American shipping is not knocking at the doors of Congress for bounties, for discriminating duties, or for subsidies; it is simply asking that it shall not be discriminated against; it is simply asking for fair play. Congress has laid a heavy hand on American shipping and it is high time that it was taken off.

It is estimated that last year \$200,000,000 was paid in carrying charges on the foreign commerce of the United States. Of these enormous earnings American ships secured only 8 per cent. Does any one pretend to say that the statistics of our export trade would not have been enriched to this extent if the sum paid for carrying goods abroad were added to the value of the goods themselves? Space in a ship is a commodity just as much as a ton of steel is. It is as deserving of protection as is the ton of steel. Both were made to be sold in competition with the products of countries whose scale of life is lower than ours. If one is protected and the other is not the unprotected suffers a double disadvantage. It suffers the disadvantage imposed upon it by its own country by reason of higher wages and higher initial cost; it suffers the disad-

vantage imposed upon it by competitive countries by reason of their lower cost of operation. Added to this is the undisputable fact that other nations subsidize their shipping and the United States does not. Is it any wonder that American shipping is languishing? Is it not time for Congress to cease its policy of discrimination against the American ship?

In this great continent-covering country, with its 70,000,000 of souls, there is not a single new vessel building for the foreign trade of the United States. The Mongolia and Manchuria, which were purchased from the Atlantic Transport Co. by the Pacific Mail Steamship Co., have lately been completed by the New York Ship Building Co. at Camden, N. J. The Eastern Ship Building Co. has just launched the Dakota, the second of the great liners for the Great Northern Steamship Co. to operate in conjunction with the Great Northern railway. These are the last of a group of seven ships, contracts for the construction of which were awarded four years ago when it seemed likely that Congress would remove the handicap against American shipping. Congress did not remove it and Mr. Alfred Winsor of the Boston Steamship Co., which gave orders for three of these ships, has said that he is through with his attempt to maintain the American flag on the ocean's highways.

It is pertinent to state, since so many laymen appear to be ignorant of it, that the coastwise trade of the United States and the foreign trade are two different things. The coastwise trade, meaning trade between United States ports, is a protected trade. Vessels of other flags may not engage in it. The past four years have marked a distinct revival in ship building for coastwise trade, but the crest seems to have been reached some time ago. However, this trade is bound to have a normal growth, the annual wastage of ships is bound to occur, and a fair amount of building, therefore, will always be done for it.

The lake ship yards, speaking roughly, are well up with their work. But this industry is special and is not subject to the ordinary vicissitudes of ocean carriage. Those best informed do not take a dubious view of things on the Great Lakes. The ships are not like other ships; the shipping is not like other shipping; it is not made up of a multiplicity of things as is ocean freight, but is confined to a few items in bulk, and while there may come seasons of indifferent business, the scale of these items will normally be an ascending one, and ships will continue to be built to carry them.

A bill is now before Congress in which every manufacturer of marine boilers in the United States is vitally interested and the measure should certainly be passed. It provides that a commission of five or seven members, representing commercial, manufacturing, maritime and military interests, shall be appointed to recommend such changes in the revised statutes of the United States as will bring about the improvement of construction and secure a uniformity of inspection of

all marine boilers and their appurtenances; and also to recommend such changes as will bring about a reciprocal recognition of boiler inspection certificates between the several maritime nations having marine inspection laws in order to prevent the shipping industry from being subjected to vexations and costly delays in foreign harbors, resulting from the incongruous laws of the several maritime countries, appertaining to the construction, inspection and operation of marine boilers. This commission is to be appointed by Secretary Cortelyou and it is to submit to him a preliminary report by Oct. 1 next. The preliminary report is then to be published and all parties interested are to be given an opportunity to suggest changes and amendments to the commission. Every protest, suggestion or recommendation is to be carefully considered by the commission before making its final report to Secretary Cortelyou for transmission to Congress. The final report is to be ready by Jan. 1 next year. Uniformity in boiler specifications is what the boiler manufacturers have endeavored for a long time to obtain. The present statutes bearing upon them are antiquated, and in endeavoring to meet new conditions which are constantly arising, the rules made by the Board of Supervising Inspectors have tended more to ambiguity and disorder than to clearness and a definite system. The only thing to do is to thoroughly revise the statutes themselves and to proceed upon a simple and uniform base. Undoubtedly such a system can be devised by the appointment of the commission called for in this bill.

If one will take his finger and course along the southeastern section of the map of Ohio he will presently come to a little black spot. This small black spot is named Athens, and it has the distinction of being the home of Gen. Charles H. Grosvenor, who, in turn, has the honor of representing the town in Congress. Athens is not a great commercial center, nor has it a port from which radiates much shipping. The waterways of Athens bear no more precious freight than ducks. It is in such a maritime center as this that Grosvenor has lived and moved and had his being. How, from the contemplation of the duck ponds of Athens he possibly could have reached his present conclusions concerning the dreadful nature of motor boats and gasoline launches, passes understanding. Grosvenor has been behind a bill to require this useful little craft to carry engineers and pilots for some time past. Wiser heads have killed this measure in Congress every time that it has been presented, but apparently, it will not down. The present measure, briefly stated, provides that all motor boats and gasoline launches under 15 tons shall carry engineers and pilots and shall be subject to the same regulations as govern the navigation of steam craft. The law at present requires all motor boats over 15 tons to carry licensed officers; it also requires—and this has always been regarded as a sufficient provision—all boats under 15

tons to observe the rules of the road relating to passing signals and fog whistles. It is no more than proper, of course, that all boats should observe the rules of the road, as much for their own safety and convenience as for the safety and convenience of others. Even pedestrians along the sidewalks have to observe the rules of the road. There is no objection on the part of owners of gasoline launches to a proper observance of the laws of navigation, which, of course, are projected for the benefit and protection of all craft. However, to require a little motor boat or gasoline launch to carry an engineer is to put her out of commission entirely. The one great point in favor of this type of boat is the fact that it can be operated by its owner. Were the great majority of motor boat owners required to hire men to run them, they would be compelled to sell their boats, because they cannot afford to employ men. The gasoline launch is not the rich man's form of diversion. He can usually afford a steam yacht or at any rate a launch requiring several men to operate.

The gasoline launch under 15 tons is usually owned by the man of moderate means, who may indeed be obtaining his sole diversion from it. He derives his pleasure from running it himself. The Grosvenor bill, if passed, would put a quietus upon a considerable department of marine industry. It certainly would lessen the demand for small launches and would compel a great many firms, whose business is solely the manufacture of the smaller launch, to go out of business. But there is a far more serious question involved in this bill. It is really a denial of a personal right. A man has just as much right to operate a motor boat as he has to pedal a bicycle. The gasoline launch is the outgrowth of the ceaseless activity of the gentleman amateur—the man who is forever endeavoring to develop something new, more for the love of the thing, more for the purpose of developing a new art or a new form of diversion, than for gain. He has, in the case of the motor boat as in a variety of other cases, evolved something that is commercially sound; and capital has, as it always does, seized upon the thing and made money out of it. The Grosvenor bill is one of those measures which seeks to put a handicap upon this form of human activity. It was the restless eagerness of the gentleman amateur to invent something that could be run by himself that developed the motor boat. It was the very fact that a steam engine by its very nature required a trained operator that made him turn his attention towards devising something more simple. Twenty years of effort have made this little gasoline engine almost perfect. It is maintained that it is simpler to manage one than it is to row a boat and certainly no one has to be licensed to row a boat. Remonstrances and protests, signed by 150,000 persons, have been filed against this Grosvenor bill. It has met with opposition from every possible point. No section alone is opposed to it. It has been opposed generally throughout the entire country, and it would seem as though the verdict against it was so emphatic that it

ought not to be revived in any succeeding Congress.

As a general principle whatever labor can be legitimately performed by private enterprise should be so performed. It is only by allowing the greatest latitude within law to individual endeavor that nations progress. As governments grow paternal personal ambition decays. There is no warrant for government interference in purely private contract work, even if the work be done for the government, unless it can be definitely proved that the people are being robbed. The government has gone into the dredging business on the pretense that contractors might combine and raise the price of dredging. The fallacy of such a view is obvious. Dredging is not a business which lends itself to combination for the purpose of raising prices. It is not a natural monopoly. The moment that prices rise to such a point as to yield more than a reasonable profit outside competition is immediately invited. Capital is ever eager to compete in any enterprise which yields more than ordinary profits from which it cannot be excluded by the nature of the business. Any man with a few thousand dollars can buy a dredge and go into the dredging business. Monopolies can only be created by controlling sources of supply. How foolish, therefore, it is to suppose that extortion could be practiced by dredging concerns even were it practicable for them to combine. The claims of the corps of engineers that they can do dredging at less cost than under the contract system will not bear analysis. When the first continuous contract was let for the 21-ft. channel at Detroit, the bids were 50 per cent. less than the estimate made by Gen. Poe, the government engineer in charge of the district. It is interesting to relate that just before the bids were opened the general told the contractors that if the bids exceeded his estimate the work would not be let. If he had any fears of a combination they must have been instantly dissipated when the bids were opened. In the continuous contract that was let for the improvement of the harbor of Duluth and Superior, the estimated cost of the work was \$3,130,553. It was done at so much less than the estimate that there was money left over to purchase lands to the extent of \$106,561.19, to rebuild the Duluth canal piers at a cost of over \$650,000 and to leave the balance of \$275,000 unexpended. The contract for improving the harbor of Toledo was taken by private enterprise at an average price of 8.4 cents per yard, which was much below the engineer's estimate. The government owns a dredge at this point and placed it upon the work, favoring it with choice digging, short tows and an inside dumping ground so that work could be prosecuted in all sorts of weather, while the contractors could only work in weather that would permit them to tow out in the lake. Notwithstanding these advantages the government dredge could not compete with the contractors as to cost of digging. The government engineer says in his report concerning it: "The cost per cubic yard of 13½ cents is somewhat greater than that

paid the contractor, but this was mainly due to the large amount expended in the repairs of the scows, which expenditure will not be necessary again for several years. The dredge was built in 1893 and the tug was purchased at the same time. The hull of the dredge is of wood and is considerably decayed and provision will soon be made for renewing it. When this is done the new hull should be of steel. The tug was not new when purchased and its hull is now very much decayed and quite beyond economical repair. I am of opinion that it would be best to sell it before it becomes entirely unserviceable and to purchase a new one for use with the dredging plant."

Here is an open confession of the very point which the Marine Review has all along emphasized—that the government engineers make no allowance for depreciation and replacement when computing the cost per cubic yard of material dredged. There is not a dredging contractor in the business who will not instantly agree to greatly reduce the cost per cubic yard of dredging if the government will agree to allow for the wear and tear of plant. The government engineers simply figure in the actual operating expenses, whereas the cost of putting in new improved machinery and rebuilding the plant is the contractor's greatest expense. It is folly to suppose that a government engineer with unlimited capital, with no plant to replace, who is not under the grim necessity of making a living out of the business, can or will work as economically as a private citizen, who has to make both ends meet. A dredging contractor's business is dredging and nothing else. He gives his whole time to it and it is not within reason that a man, who gives only an indifferent part of his time to it, can work as economically or as well. There are millions of dollars expended in private dredging plants along the waterways of the United States, and it is unjust and unfair to this capital, which has been honestly invested, to deprive it of a fair part of its legitimate field.

'Tis the greatest throat of commerce in the world, that slender neck of water which connects Lake Superior with Lake Huron. It seems incredible to say so, now that its commerce has grown to such enormous proportions, that Lake Superior is, in a commercial sense, not yet fifty years old. There is no story more thrilling and more romantic than the development of the Lake Superior country, and the beauty of it is that no part of it is shrouded in mystery. There are living chronicles of its development, men, who as boys, went into the country while its state was primeval and who have lived their whole lives there, growing with its growth, and who are living yet. It is the iron in the Lake Superior hills that has made the blood of this industrial nation run a healthy red. Iron is the backbone of any nation. That nation is spineless which has it not. The United States could not possibly have attained its industrial supremacy were it not for the presence of those rich deposits of ores in the Lake Superior

country. Fully three-quarters of all the iron ore mined in this country comes out of those hills, but it is neither their richness nor their abundance that makes the nation's position in the manufacture of steel so impregnable. It is the fact that notwithstanding they lie a thousand miles from the furnaces they can still be delivered at the furnace doors at the lowest transportation cost known on earth. Their great advantage is this contribution of nature. They have a highway along which to travel whose cost of operation has reached a refinement of economy not known elsewhere. Freight has been moved along the great lakes at a cost of seventy-nine one-hundredths of a mill per ton per mile, or less than one-tenth of a cent. Specialization has done this—specialization in the form of carrier, specialization in the methods of loading, specialization in machinery for unloading, aided by the constant deepening of the channels by the Federal government.

And yet Lake Superior, as stated, in a commercial sense is scarcely fifty years old. Fifty years ago Lake Superior was further away from civilized habitation than the Klondike was when it was discovered in 1898. The rapids of the St. Mary's river acted as an insurmountable barrier to commerce. Iron ore was discovered in the upper peninsula of Michigan by Wm. A. Burt and his party of surveyors in 1844. Philo M. Everett of Jackson, Mich., led a little party into the peninsula in 1845 and pre-empted the Jackson mine at what is now Negaunee, Mich. The following year Dr. J. Lang Cassels located the Cleveland mine at what is now Ishpeming, Mich. These mines lay about 14 miles from the south shore of Lake Superior. But the forest about them was interminable and there was nothing but an Indian trail leading from them to the lake. With great labor trees were felled to make a passage for teams through the woods. There were no roads that would bear a wagon and consequently no attempts were made to haul ore in the summer time. When winter came a few thousand tons were moved in sleighs to the shore of the lake to await the opening of navigation in the spring. The ore was then loaded upon little schooners and taken to Sault Ste. Marie, where it had to be unloaded and hauled around the rapids in wagons to be loaded again on vessels bound for the lower lakes. Of course, such a process made the ore extremely expensive by the time it reached the furnaces of Ohio and Pennsylvania, and it is true that the first shipments of ore from the Lake Superior country involved everyone in ruin that was concerned with them. Meanwhile a plank road was projected to the mines from what is now the city of Marquette, and an agitation was kept up by the hardy miners for the construction of a canal around the rapids of Sault Ste. Marie. Year after year this agitation continued and Congress finally granted 750,000 acres of land in the upper and lower peninsulas of Michigan as payment to any company which would undertake the construction of the canal. It will not be fifty years until June 18 of next year when the canal was completed and opened to commerce.

On June 18, 1855, the steamer Illinois passed up through the canal into Lake Superior and was the first steamer to make a continuous trip from the lower lakes into Lake Superior. A little later in the same day the steamer Baltimore passed down from Lake Superior into Lake Huron and thus navigation, which for countless centuries had been prohibited between these two great bodies of water, was established. From that time dates the growth of Lake Superior commerce, which is the glory and pride of the American nation. The traffic passing through Sault Ste. Marie canal is four times as great as that which passes through the famous Suez canal connecting Europe with India and the Far East; and it must be borne in mind in comprehending the importance of this statement that Suez is open all the year round whereas Sault Ste. Marie is ice-locked for four or more months annually.

A movement is now on foot, which should certainly be shared in by every American, to celebrate the fiftieth anniversary of the opening of the Sault Ste. Marie canal to navigation. There could be no more fitting occasion for a national celebration. The canals at Sault Ste. Marie belong not to the Great Lakes, but to the country at large, to Canada as well as to the United States. The Sault Ste. Marie canal is the key which has unlocked the door to the mighty treasury of the Lake Superior country. Every person has shared in the great wealth which it contains. The iron ore deposits of the Lake Superior country are more valuable than gold. A gold mine can benefit only a very few. The iron ore mines of the Lake Superior country have benefited millions. They have benefited the whole world, but the American people most of all. Iron ore is not intrinsically valuable, but it has a potentiality for distributing wealth such as no other metal obtains. Its great abundance makes its use common and its adaptability to all forms of construction has vastly extended the domain of human labor. Were it possible to follow each individual ton of ore as it came out of the Lake Superior mines, how vast a part of the world's wealth would be placed to its credit. From its primary conversion into pig iron and its subsequent transition into every form of industry and art, from armor plate to watch springs, it has paid a continuous tribute to labor. It is the avenues which iron opens to labor that make it the king of metals, and that makes the country which possesses it in greatest abundance, the natural leader among the industrial nations. Therefore, there should be a celebration next year of the anniversary of the opening of the Sault Ste. Marie canal to commerce, and the chief person there should be no less a person than the President of the United States. Senator Alger's resolution just introduced in the United States senate to appropriate \$20,000 for such a celebration should be passed.

Three important bills are now pending in Congress, the enactment of which will be of considerable help to American shipping. These bills are, first, the

Gardner bill proposing to create a commission to investigate the subject of American shipping and report to Congress in December next such legislation as would build up American shipping. This bill has been favorably reported by the house merchant marine and fisheries committee to which it was referred, and a rule has been secured for a six hours' debate, which will probably occur within a very short time. It is expected that this bill will have passed the house, and possibly the senate as well, before the close of the month of March. The commission will doubtless be at once appointed and set to work collecting data relative to the ship building and ship owning industry, and the effects upon it of foreign competition. In connection with the report of this bill some exceptional significance attaches to the fact that, although it was opposed by every Democratic member of the house merchant marine and fisheries committee, on the ground that an investigation is unnecessary, as the facts are all in hand now, and immediate legislation is what is desired, these Democrats all joined in advocating the policy of discriminating duties—the early day American shipping policy, under which our shipping grew and prospered—as the policy by which again to build up our shipping in the foreign trade.

The second bill of the three is that which reserves to American vessels the carriage of the commerce between the ports of the United States and the Philippine archipelago, under the extension of the coastwise laws of the United States, as has been done in respect to the trade between the United States and Alaska, Hawaii and Porto Rico. The cordage trust opposed the bill, on the ground that there were not enough American vessels to carry the paltry 70,000 tons of merchandise shipped last year from the Philippine islands to the United States; they also claimed that freight rates would be increased. It was shown by the shipping people that there are enough American steamships now available to carry all of the Philippine Island trade, twice over, and enough American sailing vessels to carry it all, five times over; and that until very recently our entire commerce with the Philippines was carried in sailing vessels. The senate has agreed to an amendment to this bill to extend the navigation law to the Philippines after July 1, 1905.

The third bill is that which provides for the carriage of the war and naval stores of the United States in American vessels, except in times of great emergency, when the President is authorized, if he deems the emergency sufficiently grave, to employ foreign vessels for this purpose. Official evidence has been produced to show that it is the custom of all of the great powers, such as England, Germany, France, Spain and others, to confine the carrying of their war and naval stores to vessels of their own nationality. In some cases this is done by law, in others by departmental regulation, and in others by time-honored custom from which there is no deviation. It is manifest that no

nation, depending upon the ships of other nations for the carriage of its war and naval stores, is safe. Such vessels might not be available, or the nation whose flag they fly might become involved in war, subjecting us to much embarrassment, loss and possible danger. All citizens must feel that there should be an ample supply of American vessels at all times available—as there are now—for the carriage of war and naval stores, and that legislation confining their shipment to vessels of our own is statesmanlike and patriotic. This bill passed the senate last week. Favorable action is hoped for in the house.

Commencing with May, 1904, the first number of the Marine Review, issued every month, will be devoted largely to some subject intimately associated with the marine interests of the world at large and America in particular. This plan will be followed for the sole purpose of increasing interest and concentrating thought upon some one topic whose importance makes it worthy of exhaustive and independent treatment. With this in view the following subjects have been selected for consideration on the dates specified.

May 5—"Power Pleasure Craft and Gasoline Engines." In this issue will be discussed not only every phase of the interesting situation brought about by the enlargement of the social horoscope through the rapidly growing use of power pleasure craft, but the possible influence of the gasoline or oil engine upon the business situation in the near future, and its application to business purposes.

June 2—"The Development of the Freight Carrier." In this number will be reviewed the progress made by American ship building in all parts of the country from the beginning to the present time, with a brief historical sketch of the work accomplished by leading ship builders, together with illustrations made from photographs and working drawings of what might be regarded as the most perfect types of the vessel belonging to this class.

July 7—"The Future of the Turbine Engine." The turbine engine is apparently going to be a great factor before long. This number will go very thoroughly into the subject and present in succinct and convenient form its history and its latter-day development which has culminated in a series of careful experiments to determine its adaptability for the propulsion of the swiftest and most costly steamships yet projected.

August 4—"The Canals of Sault Ste. Marie." This issue will treat historically, statistically and pictorially of these great canals—the greatest in point of commerce in the world. It will clearly be shown how great has been their influence upon the industrial life of the nation.

September 1—"The Coastwise Trade of the United States." This will give the American interested in this great sphere of our national activity a chance to fa-

miliarize himself concerning extent of our sea-going craft and the volume of business that is intrusted to their care. It will show how beneficent protection is when it is applied to shipping, for the coastwise trade is protected. Vessels of other flags cannot engage in it. Few appreciate the amount of capital invested or the value of the products that are yearly carried under the United States flag on both the Atlantic and Pacific oceans.

October 6—"Panama." This number will treat of the great enterprise of the federal government and the promise it brings of better things to our American merchant marine. By that time more will be known on the subject, and the recently appointed Panama canal commission will have formulated definite plans which will interest us all.

November 3—"Special Machinery and Appliances on Board Ship." Recent years have developed myriads of improvements in many little matters such as wireless telegraph, electrical apparatus, engineering specialties, steam pumps, steering gears, hoisting machinery, ship logs, etc., that are apt to be overlooked, but they will be considered and treated at length in this number.

December 1—"Economical Handling of Freight." In the series of articles planned to cover the handling of freight of all kinds in all parts of the world it is designed to give the reader every opportunity to study the phases of this important subject. Illuminating pictures will be presented of the contrasts afforded in the handling of freight in the different ports of the globe and how in this special field of human effort the great lakes region leads the world.

Secretary Leslie M. Shaw of the treasury department delivered an address this week in Philadelphia upon the subject "Protection to American Shipping." In the few times that Secretary Shaw has talked upon the shipping question to the public he has talked with great directness and clearness. He has definite views on the subject and he says that the quickest way to restore the American merchant marine upon the high seas is to extend to it the protection which has been afforded to every other American industry.

If we should build the ships in the United States that are needed for our foreign carrying there would be expended in our ship yards alone from \$50,000,000 to \$100,000,000 annually, and 100,000 more men would be profitably employed at skilled labor. The nation would be all the stronger for such legislation, the establishment of a great and prosperous national industry, one contributing so directly to the national defenses as that of ship building, ship owning, and ship-operating, would be of enormous and lasting benefit to all of our people, and most of all to the nation itself. The wisest statesmanship demands the immediate enactment of legislation that shall give us an abundance of American ships for the carriage of our exports and imports.

Protection is Needed.

BY ALEXANDER R. SMITH.

Superintendent of the Maritime Association, Port of New York. Compiler of Ship Building Report of Twelfth United States Census.



What is to be done to give us an American mercantile marine? That is the question that has, with increasing urgency, been confronting American statesmen for nearly half a century. The answer is simplicity itself—it must be sufficiently

protected to prove a profitable investment for capital. It is not now a profitable investment, and it is unprotected. When the era of high protection was ushered in that has built up our great industries, American shipping seemed prosperous, and it was left unprotected. During the period of our development under high protection American shipping has been steadily dropping below the horizon, and our protective policy has created and is maintaining higher cost prices and higher wage rates here than obtain in other countries. A man can buy a British ship for two-thirds the sum that he would have to pay for an American ship; and he could run his British ship for two-thirds the sum required to run an American ship. The high cost of materials and the high wages paid to labor in the ship yards and on the ships have placed that handicap upon the American ship owner seeking to compete with foreign ships in our foreign trade—and these high costs are the result of the protective policy, a share in the enjoyment of which is denied to the American ship, when built. Some people say, why should we not then buy our ships abroad, where they are cheaper? and why should we not run them with foreigners, who are willing to work more cheaply? Ask these people why we should not buy foreign steel, which can be produced for two-thirds the cost of American steel, they would answer that it is better to avail ourselves of our own materials and labor, even if such a preference does compel us to pay a higher price for our steel. We handicap foreign steel and prevent it from competing with American steel, by protecting our own manufacturers. When I say for the very same reason we should build our own ships and run them with our own people, even if the cost is somewhat greater, sometimes the very same people that see the reason why we should make our own steel with perfect clearness cannot also see why we should not make our own ships. I once appeared before a farmers' organization, asking it to adopt a resolution favoring the building of ships in American ship yards, in order, in part, to create a larger home market for the products of American farms among the people who would be employed in the building of ships. I was told, as was the resolutions committee, by an eminent granger, that American farmers received no protection. I said something about the difference between the cost of foreign and American wool, and he merely sniffed; but the fact is that our tariff imposes a duty upon foreign wool, competing with American wool, that gives American farmers who raise sheep from 33 to 50 per cent. more for their wool than they would receive were it not for the tariff on imported wool. But the man who was arguing with me said that in the raising of cattle there was no protection, and I asked him, then, why there was a duty on imported cattle, and he readily enough answered that the purpose was to prevent Mexicans and Canadians from "flooding the United States" with their cattle! But the eminent granger had his way, and the resolution was not adopted. After the committee adjourned a member of it approached

me and said: "I should have liked to vote for your resolution; I was impressed with what you said; but I am against protection." I thanked him, and asked him from what part of the country he came, and he replied Georgia. I asked him if he was engaged in raising sugar in Georgia, as the culture of the sugar cane is receiving much attention, and with encouraging results, in that state, and he replied that he raised cotton. I asked him, then, if his opposition to protection would induce him to favor abolishing the duty on sugar. To this he replied with an inquiry as to the amount of the duty, and when I informed him that it was about 100 per cent., that we could possibly buy our sugar for about one-half what it now costs us, if the duty were entirely removed, he rather lamely replied that he did not think that he "would first strike at a southern industry." I asked him if he, as a Georgian, favored the continuance of the protection on rice, provided for in our tariff, and again he asked me how much the protection amounted to, and, although I told him that rice was protected by a duty amounting to about 80 per cent., that we could buy rice possibly for 60 per cent. of what we now paid, if there were no duty on competing rice, he again replied that he did not think my question was quite fair, since I had chosen products upon which to suggest free trade that were being encouraged in his own state, by an import duty on competing foreign products. I said that my purpose in specifying sugar and rice was to bring home to him, acutely, what the consequences would be to his own section were the protection withdrawn from the products of the soil that helped to make the state prosperous. I said that both the builders and the owners of American vessels experienced precisely the hardships, through the lack of protection for our shipping in the foreign trade, that he at once realized sugar and rice producers would be subjected to in Georgia were the protection withdrawn from those staples. And yet this man told me that he did not like to look upon the question in a sectional spirit! Protection for eastern ship builders and ship owners he regarded as sectional, possibly, and to be discouraged, but protection for sugar and rice producers he could not—or would not?—see was sectional at all.

Very recently I was in Washington, and while there had the pleasure of meeting a gentleman from an extreme southern state, a representative in Congress, serving his first term. His section is given up almost entirely to the lumber industry, and it had been suggested to him that American forests were being denuded through the protection given to American lumber, and that the removal of the duty on imported lumber would help to preserve our forests and denude foreign forests. The southern representative quickly and emphatically replied that no man could be elected to Congress from his district who would vote to take the duty off of imported lumber. Possibly the last-named representative would see some justice in the demand of American ship owners for protection of their ships in competition with foreign ships, at least equal in amount to that enjoyed by his lumber-producing constituents.

I notice that a bill has been introduced in Congress to admit beef and poultry into the United States free of duty. I am sure, however, that the farmers will stoutly oppose the passage of this measure, if it should be seriously considered by Congress. We know that, much as they say that there is no protection for wheat, the farmers insist upon a high duty, 25 cents a bushel, I believe, on imported wheat, and it is laid in deference to the wishes of American farmers, just as the duty on wool, not entirely liked by wool manufacturers, is retained for the protection of American farmers. Farmers

are well in evidence, too, whenever a tariff bill is to be considered, insisting upon a high duty on eggs, on butter, cheese, vegetables, hay, hides and such things, which our Canadian neighbors would be very glad to export to us in large quantities but for this protection.

It is perfectly easy to convince members of Congress that

to repeal the duty on sugar would be to strike a staggering, if not a fatal, blow to our sugar producers; they realize that protection is essential to the healthy and prosperous condition of the sugar-growing industry, but they wonder, nevertheless, why it is that unprotected American ships are unable to profitably compete with foreign ships in our foreign carrying trade. And they wonder, too, at the hardihood of American ship builders and ship owners coming to Congress and asking for protection for American shipping, and they seem — far too many of them — quite ready to believe that a ship builder, representing an establishment in which say ten or even fifteen millions of dollars are invested, is so rich as not to need protection—as if a rich man was ready to go into an unprofitable business, just because he is rich! The sugar refiners, who have little difficulty in finding

one dollar to rub against another, and who have been charged with possessing a monopoly, and with being extremely rich, find little difficulty in convincing Congress that their demand for protection against the low-priced, low-wage-made foreign refined sugar is a just one, and they receive, despite their great wealth and their strong organization, all the protection that they think they require. The same argument that the sugar refiner uses to induce Congress to place a protective duty on foreign refined sugar, is what the American ship owner uses when he asks Congress to protect his American-built ships against foreign competition, but, strangely enough, the latter argument don't seem to "go."

One might run through the whole gamut of protected articles and contrast their healthy and prosperous development in the United States with the steady shrinkage and decline

in American shipping, which is unprotected against foreign competition, in the foreign trade. If, for cheapness's sake entirely, it is desirable to employ foreign ships, why should we not, for the same reason, have foreign manufactures, foreign farm products, foreign everything that is cheaper than American? The little that we save (?) by using foreign

ships because they carry our products a trifle cheaper than American ships would do it, is as nothing when compared with the hundreds of millions of dollars we could save (?) if we purchased foreign farm products and foreign manufactures entirely. We treat our shipping like stepchildren are said to be treated in some narrow-minded families, where it is regarded as strange that the stepchild should either ask for or expect the same treatment that the other children receive, where it is wondered at that the neglected stepchild is not so happy, so contented and so cheerful as the others. These are homely and crude illustrations, to be sure, but they help us to more clearly understand what it is that American shipping in the overseas trade is "up against," in utter unprotected and free trade competition with foreign shipping.

Were we to wipe out the duty

on imported sugar entirely, ruin would at once overtake millions of American sugar producers, who could no longer produce sugar in competition with foreign sugar; we have entirely removed the protection which American shipping in the foreign trade used to enjoy, and ruin has overtaken those who are engaged in running American ships in the foreign trade because they cannot compete with foreign ships. If we gave our ships upon the seas as much protection as we give our sugar producers, there wouldn't be one foreign ship in ten engaged in our foreign trade, while, to-day, there are ten foreign ships to every one American ship in that trade.

The nation has also lost the strong protection that inheres in merchant ships, officers and seamen of its own. These ships and men are an essential part of the nation's protection, and Congress should so regard it.



A STUDY IN SEA, SKY AND SAIL—SHAMROCK II CROSSING THE LINE.

New York's New Canal System.

BY COL. THOMAS W. SYMONS.

Member of the Erie Canal Advisory Commission, Government Engineer in charge of Executive Mansion at Washington.

In 1895 when I arrived in Buffalo from the Pacific coast, the state of New York was just finishing the work under the \$9,000,000 appropriation. This appropriation had been secured through the deliberate deception of the people. A low estimate of the cost of lengthening the locks and deepening the canal as provided in the plans was \$20,000,000, but this estimate had been pared down and arbitrarily reduced to \$9,000,000 because this was considered by those having the matter in charge to be the biggest sum that the state could be induced to appropriate for the betterment of the canals. The work itself had been very badly managed, and the whole great commonwealth was in a state of bitter indignation and disgust at the deception which had been practiced in getting the appropriation and the lack of good judgment and business ability displayed in the conduct of the work.

The outlook was beyond question most unpromising for the state taking up the subject of canal improvement again for many years, and it certainly is most remarkable that it has in the short time that has elapsed since then gone so far as it has in this way.

My first official introduction to the canal question was being called upon to make a report on a bill which had been introduced in congress for widening the locks of the Erie canal for military purposes. My report was to the effect that such widening would have little value for military reasons, but would be valuable commercially.

I was next called upon to make a report to the general government on the broad subject of what was the best and most economical canal from the great lakes to the sea. This involved a great deal of study and research and very hard work.

The net result of my labors was the conclusion that a ship canal by the Erie canal route was impracticable, and by way of Lake Ontario inadvisable, and that the proper and best solution of the canal problem was to build a large barge canal by the general route of the Erie canal, as large as the natural features, water supply, and prevailing conditions would permit.

Soon after the submission of this report to the general government, Governor (now president) Roosevelt with the unerring judgment which guides him in all public matters, appointed a committee of business men to examine into the whole canal question and advise him what the state should



COL. THOMAS W. SYMONS

do with its canals.

This advisory board, of which I had the honor to be a member, struggled with the question for over a year, collected a vast amount of statistics, and considered every possible solution of the problem that could be suggested and finally unanimously agreed that the thing for the state to do was to build a barge canal along the general route of the Erie canal suitable for boats of about 1,000 tons capacity with locks of sufficient length to take two boats at one lockage.

The board also recommended that before going further the state appropriate \$200,000 for surveys and the preparation of plans and estimates. This was done and the results indicated that the enlargement of the Erie and Oswego canals to the 1,000-ton barge size and a lesser improvement of the Champlain canal would cost \$82,000,000.

Based upon these plans and estimates a bill was prepared for submission to the legislature and the people. This was drawn by Mr. Abel E. Blackmar and myself after much study and consideration, as it was nec-

essary in the bill to provide for raising the money for the work, and to provide for carrying on the work in an efficient and economical manner and all within constitutional limits. While in the hands of the legislature the work was re-estimated as to cost and much other work added, bringing the total cost up to \$101,000,000. One of the main items added was to provide for the enlargement of the Champlain canal to the full barge size, as prescribed for the other canals. This bill finally passed both houses of the legislature, was signed by the governor, and last year at the general election was submitted to the people of the state and approved by about 250,000 majority.

New York is thus committed to this great work and active operations have already begun on it.

Thus only about eight years after the \$9,000,000 fiasco, the state has plunged into another canal scheme involving over \$100,000,000.

OLD AND NEW CANALS.

The existing navigated canals of the state of New York are the Erie, Oswego and Champlain canals, connecting respectively Lakes Erie, Ontario and Champlain with the navigable waters of the Hudson below Troy.

The new and improved canals are to perform exactly the same functions, but they differ from the existing canals in three important respects: First, as to size and capacity; sec-

ond, as to location, and third, as to the character of navigation provided for.

1. The locks of the new canals, which govern the dimensions of the boats that can be used, are 28 ft. wide, 310 ft. long and 11 ft. deep. The canal prism has a depth of 12 ft. Boats can be built which will pass through the canal carrying about 1,000 tons of freight, but it will probably be found advantageous to sacrifice some of the carrying capacity to secure better models and greater clearance. The locks will take two canal boats each of 150 ft. length coupled tandem at one lockage; and this makes the lock capacity about eight times that of the present canal. The lift of the locks is increased and the number greatly reduced.

2. A very decided change is made in the general location of the canals. The Erie canal is about 350 miles long, and the new canal follows the old canal for only about 100 miles, the other 250 miles is practically by an entirely new route. Large portions of the Champlain and Oswego canals follow new locations.

The existing canals may be called "hill-side" canals, as they go through the open country and along the upper portions of valleys, religiously keeping away from water courses to the greatest extent possible.

The new and greater canal is out in the valley bottoms in the water courses wherever practicable. The principal advantages of the valley bottom location in the case of the greater canals are cheapness of construction, greater freedom and ease of movement by boats in the wider waters of the water courses, and greater immunity from accidents that disable the canal.

3. The old canal is a "tow-path" canal, built with the distinct idea that all business on it should be done by animal towing.

In the new and larger canal no tow-path is provided and it is expected that navigation through it will be by means of steamboats properly adapted to it and towing other cargo boats.

It is this change in the method of navigation which permits the bottom valley and water course location to be adopted.

BENEFITS AND USE OF THE NEW CANALS.

It is believed that these new and enlarged canals will not only be of benefit to the state of New York in enabling her to retain and increase her commercial supremacy, but that they will as well benefit the entire region of the great lakes and that these benefits will extend far into the interior of the Great Northwest and influence transportation rates throughout the country.

Upon the great lakes many millions of tons of freight are transported every year at exceedingly low rates, far lower than are possible by any other than water transportation. The canals which New York has undertaken to build will practically extend this cheap system of water transportation to the sea port of New York and other ports in its vicinity.

It is altogether probable that the trunk lines of railroad connecting the great lakes with the sea will, when the canals are completed, have fleets of canal boats on the canal as they have fleets of lake steamers on the lakes. By means of the canal they will be able to transport the heavy and coarse freight at a lower cost than they can on their tracks, and thus relieve their tracks of unremunerative work and enable them to be more freely used for work in which there is good profit. It is also to be expected that transportation companies will be organized having lake steamers, elevators and fleets of canal boats for doing through business independent of the railroad.

The value of the canal in the transportation world will depend largely upon the enterprise and business skill and management of those who will use it.

There will probably be many large industries that will have their own fleets of boats for local and through business. All

points along the canals will have largely the benefits of being a lake port and a sea port as well.

The canal will be free of toll as the present canals are, and the existence of this splendid free waterway will unquestionably have a far reaching influence in determining the movement of commodities and fixing freight rates.

THE NIAGARA AND HUDSON RIVERS.

The state of New York has shown a magnificent spirit in voting to expend the enormous sum of \$101,000,000 in the improvement of her canals. Although the canals will be free and of very great benefit to many states embracing a large portion of the country, yet the state of New York has asked no aid of any other state or of the United States in building them.

The only request that she makes of the general government is that the Niagara river from Lake Erie to Tonawanda and the Hudson from Waterford to Troy be properly improved to enable them to be used in connection with the barge canals in a satisfactory and adequate manner. By enlarging the existing Black Rock canal and building a ship lock it will enable the ships of the great lakes to utilize the splendid natural harbor of the upper Niagara river for general commercial purposes and enable the Erie canal proper to terminate in the Niagara river at Tonawanda and then use the river to connect with Lake Erie and the upper lakes. All lake carrying interests should unite with New York in asking the general government to improve the Niagara as above indicated.

The existing government project for the improvement of the Hudson is to make a 12 ft. channel to Troy. What the state asks in reference to this river is that this project be extended from Troy up to Waterford, where the barge canal proper strikes the Hudson.

The total cost of the work asked from the general government is about \$5,000,000 or less than one-twentieth of the amount to be expended by the state in the construction of this grand waterway connecting all the great lakes with the sea and all strictly within the territory of the United States.

I beg to urge that the Marine Review, as the spokesman of the carrying interests of the lakes, take this matter up and urge that this Niagara river work especially be undertaken by the government at the earliest date possible in order that it may be completed by the time that the barge canal across the state of New York is done.

The Graham & Morton Line, with headquarters at Benton Harbor, Mich., are making extensive alterations in the steamer Argo, which was purchased by them from the Booth Transportation Co. a year ago. The cabin of the steamer is being enlarged by moving the staterooms out to the promenade deck rail from the stern to amidships. The change will increase the width of the entire cabin about 5 ft. The name of the steamer City of Milwaukee will be changed to Holland and her route will be between Chicago and Holland in connection with the Puritan. As this is a night service, an extra tier of staterooms is being placed in the Holland, which will increase her capacity by fifty-two additional staterooms. A balcony extending entirely around the cabin will afford easy access to the extra tier of staterooms. Her entire cabin will be painted white and trimmed in gold. Steam steering gear and steam capstans will be added to the Holland's equipment and steam steering gear will also be given to the steamer City of Chicago.

The Indiana Transportation Co., Michigan City, Ind., is building a new steamer to be called the Indianapolis at the yard of the Craig Ship Building Co., Toledo. A new fore and aft compound engine, 15 and 30 by 24, built by the Montague Iron Works, Montague, Mich., has been installed in the company's steamer Mary. Her boilers have also been thoroughly overhauled since she went out of commission.

Uniform Rules for Lake Navigation



BY HARVEY D. GOULDER.
*Counsel for Lake Carriers'
Association.*

The question of bringing about the greatest possible uniformity of sailing regulations applicable on the great lakes for all vessels has been under consideration at various times and now seems in a fair way of satisfactory solution, although it will necessarily take some time to mutually agree upon and then accomplish the changes.

A brief résumé of the subject will not be out of place. Prior to 1863 the question of regulations was in quite a chaotic state. There were the established practices of seamen; various sovereignties had made rules, but the modern idea of a complete and definite set of regulations with conformity



MR. HARVEY D. GOULDER

by different nations may fairly be said to date from 1863. A consideration of these earlier conditions would be interesting only from an historical point of view.

In 1863, England, by appropriate action, formulated a set of regulations which were adopted here in 1864 by act of congress, which afterwards became and is referred to as section 4233 of the revised statutes. This set of rules within a brief time from their promulgation by Great Britain was adopted

by some thirty nations. As a matter of course they were taken to apply on the great lakes, and with some questioning and more or less doubt they were held to be the rules applicable in American waters until the adoption of the so-called White law in 1895. With the enactment of these rules of 1864 authority was conferred upon the Board of Supervising Inspectors to make specific rules in amplification of those prescribed by the statute. Very naturally the rules made by the board and the limit of the authority of the board became frequent subjects of argument in litigation.

In the year 1885 a new set of rules, with some material modifications, was adopted, and a question arose as to whether these applied to vessels navigating the American waters of the great lakes, the doubt arising from the exception in our statute of the lakes and inland waters of the United States. The consensus of judicial opinion was that they did not apply to the great lakes; that they were still governed by the rules of 1864. What are referred to as the international rules of 1885, because adopted by congress in that year, were adopted in England in 1884, and following that were adopted by Canada and became the rules so far as Canadian waters were concerned.

The difference which ultimately attracted most attention was that whereas under the rules of 1864, as amplified by the Board of Supervising Inspectors, the giving and answering of signals was made or regarded obligatory; in the international rules of 1884-5 which were adopted by Canada, the giving and answering of signals was made optional and were limited to cases where vessels had each other in sight. No provision whatever was made for vessels passing in fog or thick weather. The present Canadian rules, as we understand them, modify this to the extent of making signaling obligatory between vessels in sight of each other.

This was the general condition when an international marine conference was called to be held in Washington in 1890, for the purpose of formulating rules of world-wide application. The great lakes had no representative in that conference either from the American or Canadian side, and no one connected with the conference had a just appreciation of the special needs of lake navigation. The same thing was true with reference to the navigation of the great internal rivers of the United States. The results of the labors of that conference were formulated into a bill which was adopted in 1890 by the United States, to take effect on the proclamation of the president whenever it had been adopted by a certain number of nations interested. The regulations recommended by this conference were under consideration by the different nations involved for a long time. It was not until 1894 that the president felt the time was ripe for issuing the necessary proclamation, and, in passing, it may be mentioned that this proclamation was later withdrawn by the United States and it was not until 1897 that the rules became operative.

Returning to the question of the great lakes. The international regulations, which had been framed without reference to them or to the internal rivers of the United States, was conceived by the lake people and by the river pilots to be burdensome and not an improvement on previous regulations so far as our particular requirements of navigation were concerned. The rules of 1864 were fairly satisfactory. The opinion of the attorney general was sought as to whether the regulations adopted on the recommendation of the international marine conference would, when made operative by the proclamation of the president, apply to the great lakes. The opinion of the attorney general was that they would so apply. Meantime the Board of Supervising Inspectors had issued a circular directing and insisting that passing signals could only properly be exchanged under existing law between vessels in sight of each other. This was undoubtedly the law on the coast under the act of 1885. It is very questionable if this were true under the law of 1864, which continued applicable on the lakes. It would undoubtedly be true under the law of

1890, which the attorney general said would govern the great lakes when it went into effect.

The matter was taken up by the Lake Carriers' Association and by the Ship Masters' Association. After the fullest discussion the unanimous opinion was reached that the rules proposed by the international marine conference would not be suitable to the necessities of lake navigation. Thereupon the rules extant or proposed were gathered together, and the question submitted to the various lodges of ship masters and pilots on the lakes, with the view to formulating, with the aid of their practical experience, a set of rules which would best answer the requirements. The result was embodied in the White law, so-called. Counsel for the Lake Carriers' Association, with a delegation of some sixteen masters from the various lake ports, went to Washington, and procured the enactment of the White law as meeting the requirements of our navigation.

The one blast port passing signal was emancipated from any other meaning by requiring every steamer in fog, with or without tow, when navigating in thick weather, to give a signal of three blasts, instead of the previous signal of one blast for a lone steamer and three when with tow. The purpose was to have one and only one meaning for a signal under all circumstances, and so to relieve the master or pilot of perplexity arising in the varying conditions of hearing signals. There remained under the White law authority to the Board of Supervising Inspectors to make rules in amplification of but not in conflict with the rules formulated by the statute. In respect to lights to be carried by smaller craft, which would not be numerous, entire authority of regulation on this subject was left with the board, so that without the difficulty of appealing to congress, the special needs of these craft could be cared for as the circumstances might require.

The White law was modeled upon the international law of 1895, which is substantially the Canadian law of today, and the law of 1864, so that the differences between the Canadian regulations and ours are few and are only of consequence because it is so highly important that there should be no difference.

When the White law was prepared, it was the intention to invite the Canadian marine interests to joint conference, but the opinion of the attorney general that the international rules proposed by the marine conference would go into effect in March, 1895, according to the then proclamation of the president and be applicable to lake navigation, made the situation one of the greatest exigency. The time in which to act was too limited to admit of joint conference. It was had in mind that there would properly be an effort at uniformity, and in the White law the eastern limit of the application of the rules was placed at Montreal, as marking the division between lake and ocean navigation. At the same time representatives of the pilots of the Ohio, Mississippi and other rivers of the United States procured the exemption of those waters from the proposed international rules.

Now the effort is making for bringing the Canadian and our rules into exact conformity or as nearly that as possible. In conference between the Lake Carriers' Association and the Canadian Association held in Buffalo recently, it was said by the Canadian representatives that any proper modification in the Canadian law could be made by order in council. It was therefore concluded tentatively that views be exchanged and that it would be advisable if possible to make the necessary changes on their part by order in council, and on our part through the Board of Supervising Inspectors, in order that delay in securing parliamentary or congressional action might be avoided and consummation had at the earliest time.

The desirability of bringing about this conformity is illustrated in the decisions of the courts. It is properly held that the navigation laws within a sovereignty are to be observed by all vessels. By going into those waters they make themselves amenable to the laws and are bound to know them.

When on the high seas the ship is so far regarded as part of the territory of her nationality that she may properly observe and is bound to observe the laws of her flag. The great lakes have been treated as high seas for certain purposes by some courts; by other courts, and perhaps for other purposes, they have been considered inland waters. Some courts have gone so far as to call them "inland waters of the United States," although they divide two nations. Questions will always arise as to what law governs the ship.

But a practical question arises constantly with the growing commerce of the United States and of Canada and the promised immense growth of the commerce of both countries. How is the navigator at night and in fog and thick weather to know the nationality of the vessel with reference to where he must navigate? The supreme court said in a recent case:

"Were all the commerce of the great lakes carried on in American vessels the question would be less difficult of solution. But as much of this commerce is Canadian, and it is impossible to tell whether an approaching vessel be American or Canadian, an attempt to apply the laws of the United States in all cases might result in confusion and in great injustice to Canadian vessels, in case the rules and regulations of the two countries differed in any material respect."

All must agree upon the desirability of having uniformity so that it shall not matter whether the ship is of the United States or of Canada, whether the great lakes are to be regarded as high seas or whether one-half of each lake, except Michigan, is in the sovereignty of the particular country, and no one need to consider whether a boat whose lights he sees or whose signals he hears is of one nationality or the other, because wherever it is or whatever it is, the rules governing are the same. It behooves us then on both sides to have no pride of opinion about this matter, but for both sides to go along the lines of least resistance to bring about the uniformity which will make all of these questions perfectly immaterial.

WORK AT ROACH'S SHIP YARD.

Chester, Pa., March 9.—Work on the Ocean Steamship Co.'s new ship, which is being constructed at Roach's Ship Yard, Chester, is being pushed rapidly, but it will be at least three months before she is launched. When the launching takes place the City of Columbus, building for the same company, will have left the yard in a completed condition. The latter vessel is being fitted out with her boilers and engines and will probably leave the Roach yards in about one month. The building of these two vessels, practically all the work of this character the Roach people have booked, has kept a large force of men at work all winter and there is in prospect a great deal more as bidding is going on for some large contracts.

In accordance with its usual plan the Chester Shipping Co. proposes to make a thorough spring inspection of its vessels the Riverside and the City of Chester and whatever refitting they will need for the spring and summer traffic will be supplied. The vessels have had a very heavy winter battling with more ice than for many years past. For weeks, while the Delaware was frozen up, the boats were hardly impeded in their trips between Chester and Philadelphia, the staunch craft practically keeping open the channel for smaller vessels. The passenger and freight steamers Brandywine and City of Chester, plying between Wilmington and Philadelphia, will be overhauled and put in the best possible condition for the summer trade, which, it is believed by rivermen in this section, will be unusually heavy.

A bill has been introduced in the Virginia legislature to appropriate \$10,000 for the purchase of a silver service for the battleship Virginia, which will be launched April 5 from the yard of the Newport News Ship Building & Dry Dock Co., Newport News, Va.

Panama Canal: Its Present Status.

A Succinct and Complete Account of Its History up to the Present Time—Extent of Constructive Work Actually Performed.

There is an enormous amount of machinery now on the Isthmus belonging to the French company. Some portion of it will undoubtedly be valuable, but no one can tell how much until it is overhauled by experts. I hope we shall be able to get something worth while out of it.

J. E. Walker

A canal across the Isthmus of Panama, the dream of centuries, is shortly to become a physical fact. The great work, begun by De Lesseps, is to be completed by the United States government. The conclusion of the negotiations for the title to the Panama canal property is in sight, and within thirty days, perhaps less, the United States will be in full possession of the property and the money consideration will have been paid to both the republic of Panama and to the new Panama Canal Co. Attorney General Knox has advised President Roosevelt that he is authorized to pay at once to the republic of Panama the \$10,000,000 stipulated by the treaty, the ratifications for which were exchanged last week. He has also advised him that he is authorized to pay the new Panama Canal Co. the \$40,000,000 which, under the agreement, the United States is to pay the company for its property. The Canal company has been notified that the United States is ready to close the transaction. The details in connection with the transfer of the property should not require more than thirty days.

What this may mean to the civilized nations of the earth must be left to the future to unfold. It is probably the last great change that man will make in the geographical structure of the earth.

The concern of the immediate future is the digging of the ditch. It means the expenditure of millions of money for labor and machinery. In acquiring rights and titles to the canal, the United States secures the machinery, houses and other equipment of the old Panama company. These possessions represent a great variety of machinery, boats, dredges and supplies. It is conservatively estimated that some \$20,000,000 worth of machinery is decaying on the isthmus. The last United States Commission made a hasty inventory of this machinery, but it recommended to the government that no attention be paid to its existence, for in all probability it would be good for nothing except junk.

The first canal company was very extravagant in its purchases of machinery, and more than could be used was shipped to the isthmus. It is now nearly twenty-five years since a great part of the machinery was sent there, and all that time it has been exposed to one of the worst climates in the world. There are machine shops scattered along the line of the canal, equipped with steam hammers, cutting and sawing tools and a great variety of small machines, which are in a fair state of preservation, owing to their protection from the climate by the buildings, but outside of the machine shops the condition of the machinery is as unsatisfactory as it well could be. Moreover, machinery of such an antiquated pattern would be useless now-a-days, even were it in working shape.

There is a railroad along the line of the canal, but the rails are very light and may not be able to stand the traffic required of them. Over 100 locomotives were shipped to the isthmus, but were never used at all. They are much lighter in weight than any locomotive used today, their wheels have narrow treads, and they are not at all adapted to the work required of them. Thousands upon thousands of tons of light steel rails are piled up along the line of

the canal and have been allowed to rust for nearly a quarter of a century. Millions of dollars worth of machinery was sent to the isthmus before it was actually needed, and very little of it, naturally, is now in good order.

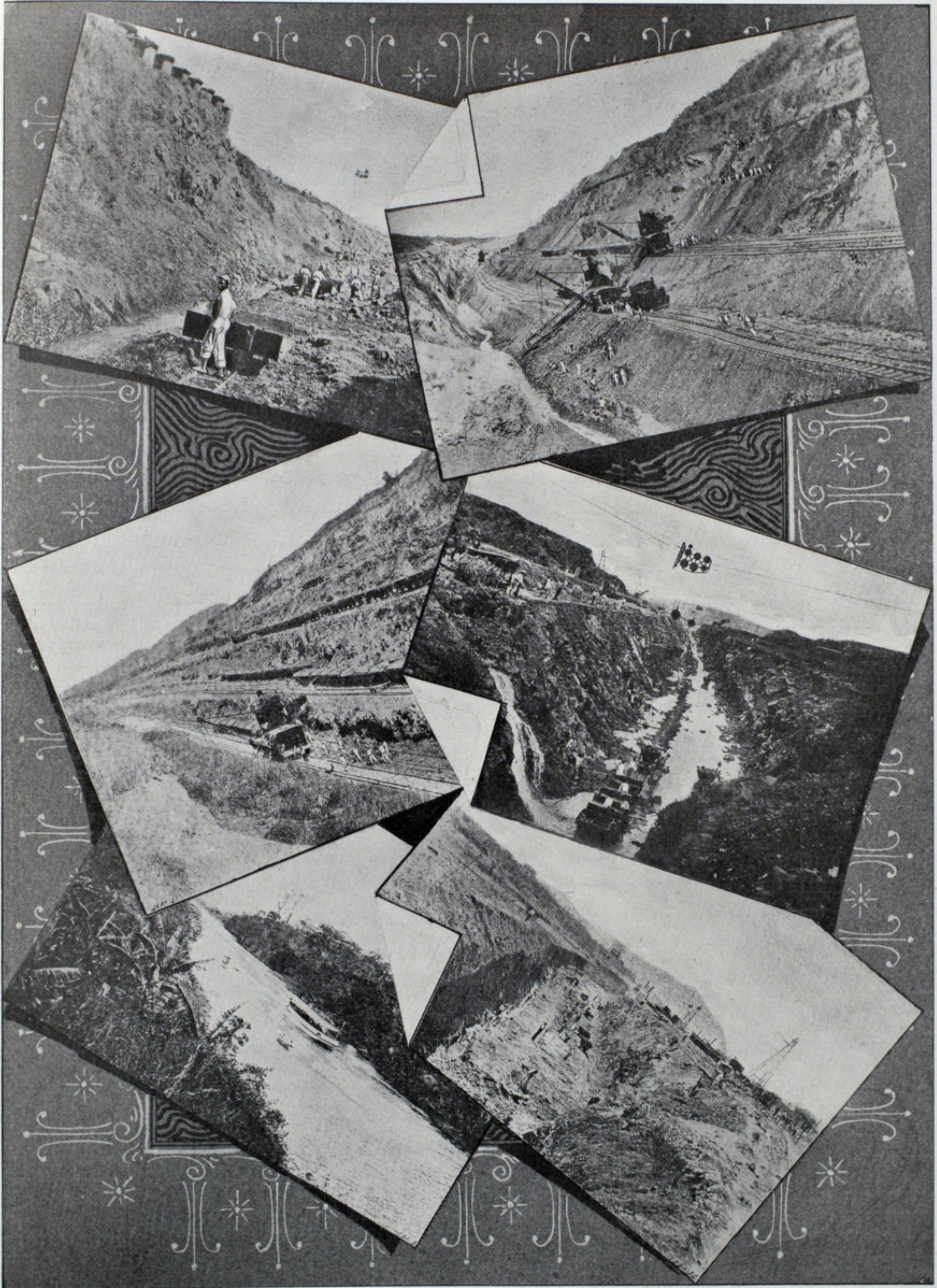
In the harbor of Colon there are scores of steam dredges and craft of all kinds and sizes. It is related that the heaps of steel and iron dredging buckets and scoops alone cover many acres of land and are piled up in endless confusion. Everything, dredges, boats, locomotives, lathes, buckets and machinery of all kinds—have suffered the rot of age, and undoubtedly most of it will have to be replaced by new machinery. It is estimated that from \$5,000,000 to \$10,000,000 worth of new machinery will have to be purchased to replace the worthless stuff now on the isthmus. The buildings along the line of the canal, of which there are some 2,500 in all, are reported to be in fairly good condition and can probably be made habitable.

The physical conditions are briefly these: The canal will be 46 miles long, varying from 250 to 500 ft. wide at the top, 150 ft. wide at the bottom, and 35 ft. deep. The depression where the canal crosses the mountains was originally 345 ft. above sea level. The French canal company has cut it down one-half. There will be five double lifts or twin locks, each with a lift of from 41 to 45 ft. To control the water of the Chagres river that crosses the line of the canal, the largest dam in the world will be built. It will be one-quarter of a mile long and 300 ft. wide at the bottom. It is estimated that it will be necessary to sink caissons to a depth of 128 ft. greater than was ever reached by the pneumatic process, to secure a good foundation. This dam will create a lake of 31 square miles, that will furnish water for the locks and power for lighting the canal at night. It is estimated that 40,000 day laborers will be employed to dig the canal, and these will probably be drawn from among the Jamaica negroes. The plans for construction have been so fully determined by Admiral Walker and his associates on the commission, that it may be assumed there will be no delay in getting to work upon the undertaking. The members of the commission appointed by President Roosevelt to supervise the work are: Rear Admiral John G. Walker, chairman; Maj. Gen. George W. Davis, retired; William H. Burr, New York; Benjamin M. Harrod, New Orleans; Carl Ewald Grunsky, San Francisco; Frank J. Hecker of Detroit and William Barclay Parsons, of New York.

HISTORY OF THE CANAL.

The history of the Panama Canal and the state of construction as it actually exists at present are succinctly and precisely these:

It is well known that the old company, organized to open a canal across the Isthmus of Panama under the name of Compagnie Universelle du Canal Interocéanique, was compelled at the end of 1888 to abandon its undertaking, having failed to obtain from the public the resources needful for its completion, and that this company was then placed in liquidation. Many persons know, but more still are ignorant of the fact, that the receivers, in accord with the creditors of the old company, or with their legal representative, instead of proceeding to a final liquidation, which would have been disastrous to the interests involved, resolved to attempt, and after great efforts and overcoming many difficulties, succeeded in organizing a new company under the name of Compagnie Nouvelle du Canal de Panama to resume the task abandoned by the old company, and if possible to secure its completion under conditions satisfactory to the demands of navigation and practicable, financially, under the difficulties to



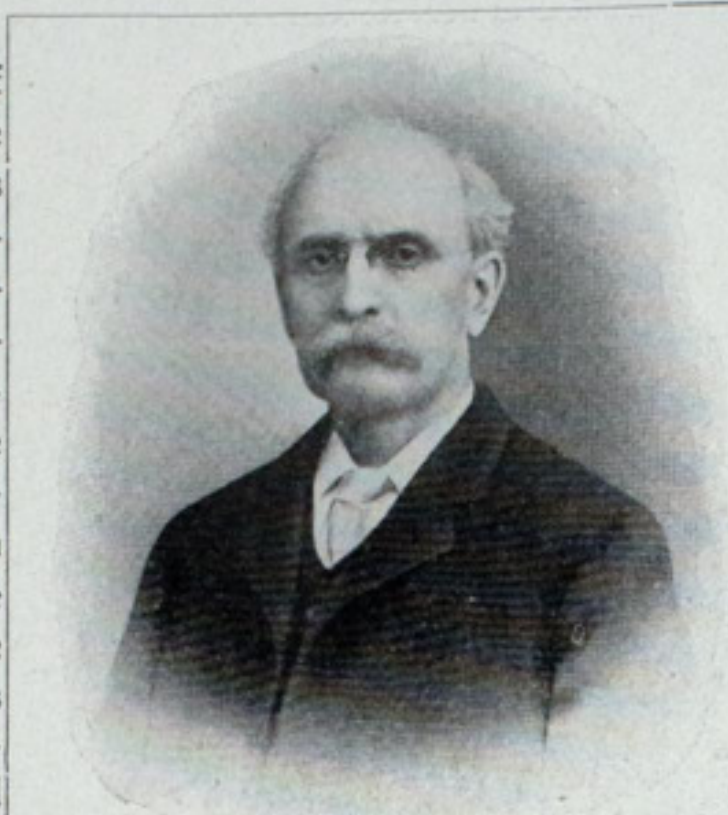
THE CUT OF THE EMPERADOR; AT WORK IN THE CUT OF THE CULEBRA.
 THE CULEBRA REDUCED FROM 310 TO 149 FEET; TRAVELING CABLEWAYS IN THE CUT OF THE EMPERADOR.
 VIEW OF THE CANAL; DIGGING IN THE CUT OF THE EMPERADOR.

be expected.

At the close of October 1894 the new company was definitely organized, and extensions of the concessions were secured from the Colombian government, through whose territory the canal passes. The new company was completely independent of the old company, and of its creditors. From the date when it was organized the new company resumed work on the canal and carried it on regularly until the Spanish-American war broke out and put an entirely different political aspect upon the entire situation.

WORKS EXECUTED BY THE NEW COMPANY.

So far as actual work to complete the canal proper is concerned, the new company concentrated its efforts upon the excavation of the great cut through the continental divide, which is commonly known under the name of the Culebra. There were various logical and judicious reasons for this course. In any case, and under whatever plan may be adopted, this great cut,—concerning the execution of which unfounded fables have been circulated, and much discussion has arisen carried even to the extent of disputing its practicability,—this great cut must constitute a definite part of the undertaking. One feature only admits of variation,—the depth of which it is to be carried. From every point of view it was certain that a great depth was necessary



MR. W. L. BROWN.

The Future of Lake Ship Building.

BY W. L. BROWN,

President of the American Ship Building Co.

That ship building on our Lakes will continue to flourish. Like all great industries it will have its periods of inactivity and periods of activity, but there is a large wooden tonnage that must gradually be replaced and there is a continued increase of various products that will seek the Lakes for transportation and this field is bound to largely grow; there is also a demand for cargo carriers and this will grow because of present congestion at large Rail Road centers. Of late years a number of high class passenger steamers have been built, inviting the attention of people to lake travel and this business will materially increase. I look for a gradual increase in the carrying capacity of our freight carriers, but think this growth will be slow, as for general business purposes, the steamer that carries 6000 to 6500 tons is so well fitted for 'all round' work that it will be the favorite for some years to come, but ultimately the larger carrier will come into use for a considerable percentage of business, hence taking into consideration all the prospects and conditions I look for a fair business in ship building for a good many years.

*Pasadena Calif
Feb 29th 1904*

*Yours Truly
W. L. Brown
President*

to secure a satisfactory canal and that the huge mass to be removed would exact a much longer time than any excavation on other portions of the canal. The logical deduction from these facts was that this work should be undertaken first, and carried forward sufficiently to reduce the delay here to an equality with that elsewhere. Furthermore it was possible to excavate here, within these limits, without any risk of misapplied labor, and without prejudging the plan that should be ultimately adopted. These reasons justified the action of the new company in concentrating all its actual excavation upon this special locality, which by its importance dominates all others. The excavations carried on by the new company extended over about 5 miles, embracing the sections of the Emperador and the Culebra. The photographic views exhibited in this issue give an exact idea of the organization and progress of the work at a point 34.2 miles from Colon, which is the highest point of the continental divide, the bottom of the cut has attained a level of 148 ft. above sea level where the original height, measured on the axis of the canal was 345 ft. The total volume removed from the entire central cut by the new company since it undertook the work was about 5,000,000 cubic yards. This was accomplished chiefly with the plant received from

the old company, with some new machines that it was desirable to test with a view to future work. The execution has been carried on by day labor, which has accurately made known to the company the actual cost, and has thus furnished the basis on which to establish the unit prices of future work after giving due weight, of course, to any variation in the conditions.

In addition to the work above indicated, which relates to the construction of the canal proper, the new company constructed, at the cost of the Panama railroad, an important wharf at La Boca, which is situated at the point where the canal enters the bay of Panama. This wharf, connected to the line of rails, and supplemented by the dredging of a deep basin, permits to approach the road and unload directly into the cars or vice versa. This was not possible heretofore, because lack of deep water compelled ships to anchor several miles from the old terminus of the railroad, and lighter their cargoes.

INVESTIGATIONS AND PLANS.

After long and laborious investigations, which during many years have required on the Isthmus every kind of survey and measurement to determine its topographical features and geological structure at every spot or emplacement where works could be anticipated, the new company definitely settled upon the plans for a canal with locks, including several variants. This plan, which has received the approval of the committee of consulting engineers, may be summed up as follows: The total length of the canal from the point where it leaves the bay of Limon to the point where it enters the bay of Panama, is 43.5 miles. About 3.1 mile should be added for its extension through the bay of Panama to reach deep water, which makes its total length 46.6 miles. The summit level has its bottom level at a height above mean tide of 68 ft., and its highest water level at 102.5 ft. above mean tide. The descent of the ocean on each slope is effected by four locks, disposed on the Atlantic side in two flights of two locks, and on the Pacific side in one flight of two locks and two single locks. The locks are all double, with two parallel chambers each 82 ft. wide and having a serviceable length of 738 ft. Their greatest lift is 29.5 ft. The Atlantic level, whose tides in the bay of Limon are insignificant, extend to Boko where is encountered a flight of two locks. The second level consists of a great lake, into which the Chagres discharges, and through which the canal forms a submerged channel extending to Obispo, ending in a flight of two locks. The normal level of the lake is 55.8 ft. above mean tide; but it may fall to 52.5 ft. in seasons of extreme low water, or rise, rarely, at the moment of an exceptional flood of the Chagres to 65.6 ft. The next level, that of the summit already described, extends to the single lock of Paraiso. Its water may vary between 97.5 and 102.5 ft. above tide. The fourth level terminates at the flight of two locks at Pedro-Miguel having a water height which may vary between 73 and 76 ft. above tide. The fifth level ends at the single lock of Miraflores. Its water plane may oscillate between 17 and 20 ft. above tide. Beyond the lock the Pacific level is reached. Here allowance is made for a tidal range of 9.8 ft. above and 3 below mean level.

The summit level will be supplied with water by a feeder conveying water drawn from the Chagres at Alhajuela, about 9.5 miles from the canal. The needful reserve will be stored by a masonry dam established on rock in a gorge of the valley. This dam will form a great reservoir, intended in part to store the reserves needed in the season of low water, and in part to co-operate with the lake of Bohio in holding back a portion of the volume in great floods and thus controlling them.

The normal width at the bottom of the canal will vary in the different levels. For that of the Atlantic it is 98.5 ft., with two great passing stations where it is 197 ft. In the

channel through lake Bohio it is 164 ft.; in the summit level, 118 ft.; in the next two levels, and in the land part of the Pacific level, 98.5 ft.; and in the channel through the bay of Panama, 164 ft. The minimum draught of water throughout the canal is 29.5 ft., increased to 32.8 ft. at the middle line of the lock chambers, and to 31 ft. at their side walls.

In the plan thus succinctly stated, the bottom of the summit level is fixed at 68 ft. above mean tide; the depth which it was believed could be reached in the time which would be required to complete the rest of the work. In consequence, this was the plan which appeared to the new company to present the advantage of equalizing the delays of the work of excavation on the one hand, and of those of the permanent construction on the other. But experience itself acquired by the company at the central cut, and the important verifications it has furnished as to the nature of the soil, as to its geological consistency and its stability, combine to induce the belief that the central cut could in all security be carried to a greater depth if it were possible to accomplish it within the time demanded by the concession to complete the rest of the canal. The new company thought it might chance that circumstances in the future might permit the excavation of this cut. In that case it would be advantageous to suppress the entire level above the plane of water represented by lake Bohio, and adopt this lake itself as the summit level. The company prepared a plan, a variant of the preceding, which fulfils these conditions; and in which, consequently, the special feeder becomes unnecessary. The general features of this second plan were so adjusted to those of the first, from which it was derived, that it would be possible to pass from one to the other without loss of work already executed if in the progress of construction experience should show this to be desirable.

The line of the canal as projected by the new company exactly followed that adopted by the old company, and thus utilized the extensive excavations made by the latter. The essential and capital difference between the two plans lay in this: The old company sought to achieve a canal at the ocean level; but near the end of its existence, it decided to avail itself provisionally of a plan with locks, which subsequently was to be transformed to a canal at the original ocean level. To reach such a solution, the old company had to overcome two considerable difficulties,—the excavation of the great central cut to a depth of 29.5 ft. below the sea level, and the creation of a new bed for the Chagres outside the canal, which for a long distance occupied the natural bed.

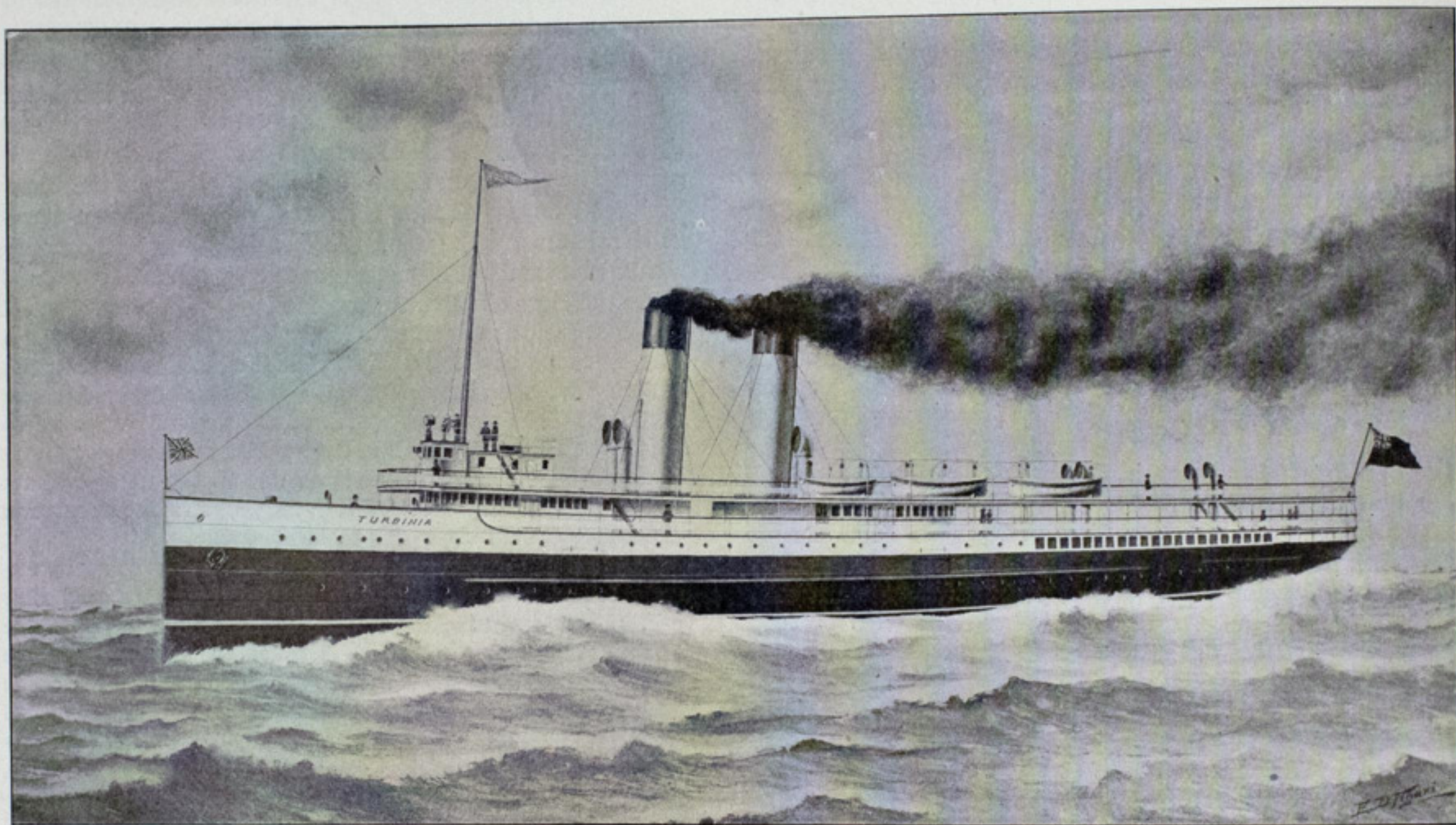
The new company was organized with a stock capital of 65,000,000 francs; this was only a temporary provision, which would permit the work to continue until, the preliminary investigations having been thoroughly and carefully completed, it should be possible, with a full knowledge of the conditions, to reach a definitive plan for completing the canal, if this should then be deemed expedient. These investigations were completed in 1897, and since 1898 it would have been possible to come to a decision, and take the measures necessary for resuming work on a large scale. But an outside event of great importance intervened to indirectly complicate the situation, and introduce new elements of a nature to powerfully influence the decisions and arrangements to be made. This event was the Spanish-American war, and the popular opinion it created in the United States in favor of the construction of an interoceanic canal through Nicaragua. It was clear that the menace of beginning the construction of a river canal, with the intervention and assistance of the American government, constituted for the new company a formidable obstacle to raising the ways and means for the construction of its own canal. The popular favor in the United States toward the idea of a canal in Nicaragua was largely due to opinions suggested by the failure of the old company.

Nicaragua also had powerful and disinterested champions, notably Senator Morgan of Alabama, who had given his whole

life-work to the furtherance of an interoceanic canal; but it was quite clear that with the entry into the field of so powerful an interest as the government of the United States the new Panama Canal Co. could not hope to induce financial interests to advance the money necessary for the completion of the Panama canal. The company, therefore, made overtures to sell its property to the United States government and eventually settled upon a figure of \$40,000,000. In one of the most remarkable of speeches the late Senator Hanna convinced the United States senate that the Panama route was not only the

more practicable but that it had been offered to the nation at a bargain. It was resolved to accept the French company's offer and these are the negotiations the details of which are now reaching a final settlement. There have been other issues latterly involved, such as a revolution in the isthmus and the secession of the state of Panama from the United States of Colombia but with this internecine political strife the present article has nothing to do. It is devoted wholly to the Panama canal from the physical and commercial standpoints.

Turbine Steamer for the Great Lakes.



THE TURBINIA WILL CONVEY AN IDEA OF THE GREAT LAKES TURBINE STEAMER FOR THE TORONTO-HAMILTON ROUTE OF THE TURBINE STEAMSHIP CO.

The innovation in steamship propulsion during the past two years has been the installation of turbine engines in the mercantile navy. The first of these were the King Edward and the Queen Alexandria, built for service on the Clyde. These were followed by Channel steamers, which have been very successful indeed in bridging the silver streak that separates England from France. A turbine steamer has also just been launched for service in the Irish sea, and one has been projected for service between Australia and New Zealand. A few others have been ordered, and one or two contemplated, in Great Britain. There have been no American-built turbine steamers as yet, nor are there any turbine steamers operating in American waters except two yachts, the Tarantula and Emerald, which were brought over from Great Britain. It is, therefore, a matter of more than passing interest that the first turbine steamer to regularly engage in trade in American waters will come to the Great Lakes. The Lake Ontario Steamship Co., lately reorganized as the Turbine Steamship Co., expects to have its turbine steamer in operation between Hamilton and Toronto by June next. She is now being built by Hawthorn, Leslie & Co. at Hebburn-on-Tyne, Eng., who were the designers of the British torpedo boat Viper, which attained the extraordinary speed of 37 knots or nearly 44 miles an hour. The Turbine Steamship Co. has fully recog-

nized the possibility of turbine boats for passenger service on the lakes, and with the delivery of this new vessel, the company will inaugurate a new, quick service from Hamilton to Toronto. The steamer will be specially suited to the service and will be built to both the British Board of Trade requirements and those of the Canadian government. She will, of course, be Canadian-canal size, being 260 ft. long, 35 ft. beam and 20 ft. 9 in deep, with 1,200 tons displacement. Under Canadian law she will be permitted to carry between 1,500 and 2,000 passengers. A special saloon, paneled in polished mahogany, will be situated on the main deck aft, the sitting accommodation being arranged to form ten comfortable bays. In close proximity to this saloon will be the tea and ladies' room, both fitted up in the latest styles. Below the saloon on the floor deck will be a large dining saloon with ample sitting accommodation, the galley and pantry being arranged forward of it. The smoking room will be on the promenade deck. On the main deck will be a deck house, forming a large entrance hall to the main saloon, the gangway doors for passengers being placed at each side of this hall, and an easy staircase will give access to the dining saloon below. Cargo will only be carried on the main deck forward. The promenade deck will have a fine reach of clear space forward and aft, and there will be a large, well lighted

shelter forward. The hurricane deck will also be available as a promenade deck, being clear from end to end, except for the space required for stowing life boats and life-saving apparatus.

The greatest interest of course centers in the engines of the new vessel. These will consist of three Parson's compound steam turbines as follows: One high-pressure turbine on the center line ship and one low-pressure on either side. Each turbine will control an independent line of shafting and there will be three propellers, one on each shaft. The reversing turbines which will be of special size, will be incorporated in the low-pressure turbines to admit of the boat being worked astern. Steam will be supplied by two large cylindrical boilers. Propelling machinery will be capable of driving the vessel at a speed of about 21 miles an hour. It is well known that the turbine does not reverse and consequently independent machinery has to be carried for that purpose. There has been some question as to whether the turbine is adapted to short runs, with the necessity of frequently touching port, such as obtains on the runs on the great lakes, but it is quite clear that the Turbine Steamship Co. expects no trouble on this score. The illustration of the *Turbinia*, accompanying this article, will convey an idea of what this new turbine steamer will be like.

Messrs. H. & A. Allan of the Allan Line of steamships, write to the Marine Review to say that they expect to place their new turbine steamer *Victorian* in the Atlantic service between Montreal and Liverpool next August. The *Victorian* will be the first turbine steamship to be engaged regularly in the north Atlantic trade, and she will be by far the largest as well as the swiftest of the Allan fleet. This venture on the part of the Allan Line is probably the most daring thing that has been attempted in steamship circles in several years. It is daring because it is primal. Undoubtedly the Allan Line believes the turbine system to have passed beyond the experimental stage and to be an assured success, otherwise they would not put to hazard so great a sum of money as is now involved in the construction of a modern liner. This radical departure of the Allan Line lends especial significance to the fact that the Cunard Steamship Co. has just ordered a 12,000-ton steamer to be equipped with turbines and throws an interesting side light on the deliberations of the Cunard turbine commission, which is investigating the availability of the turbine engine for the propulsion of the two Cunard flyers. These flyers are to maintain an average speed of 25 knots across the Atlantic ocean under guarantee with the British government.

The *Victorian* will be fitted in the most modern style for upwards of 1,500 passengers, and it is expected by reason of the absence of the throbbing movement inseparable from the ordinary steam engine, and the rapidity and unbroken steadiness of revolution in her shafting and propellers, to be at once noiseless and steady in a seaway, even while exerting the whole of her great power. The shafting of the *Victorian* has been specially designed for the requirements of ocean and island navigation, and consists of three shafts with one propeller on each. In the *Turbinia* of which, as stated, an illustration accompanies this article, the low-pressure turbine is on the center shaft, with the high-pressure engines on the outside shafts. In the *Victorian* and on the great lakes turbine steamers, building for the Turbine Steamship Co., this order has been reversed, the high-pressure engine driving the center propeller while the low pressures are attached to the outside shafts.

For the benefit of those to whom the name "turbine" does not convey any clear idea, it may be explained that the mode of producing rotary motion in the shafting and its attached propellers is, in principle, the same as that of the old-fashioned windmill, the force in the turbine, however, being steam instead of wind, and the angled arms and sails of the wind-

mill being represented in the turbine by metallic vanes set on the surface of a conical casting, which forms, by attachment, the forward end of the propeller shafting; these vanes, working into counterpart flutings on a fixed, surrounding, hollow casting, complete the device. The steam, entering at the forward end of this combined arrangement of blades, can only find passage by forcing the parts attached to the shafts into rapid revolution. Rushing along with the momentum due to its volume and boiler pressure by means of powerful air pumps operating at the other end, the steam imparts a steady, unceasing, rotary movement to the propellers, utilizing to the best advantage the whole boiler power of the ship. Crystallized in a sentence the turbine claims over the reciprocating engine a saving of weight, cost, space, attendance, and upkeep, and smooth continuous action with no rubbing surfaces, and no thrust friction, for the thrust is taken by the steam itself.

The Parsons turbines are of the parallel flow type, the general course of the steam through them being parallel to the axis of rotation. In each of the turbines steam enters at the forward end and streams aft through an annular space formed between the outside of a cylindrical boss, which is carried by the shaft, and the inside of a corresponding cylindrical casing in which the turbine is enclosed. In streaming through this space the steam passes alternate rings of fixed guide blades and moving turbine blades. Having traversed the series in the high-pressure engine it goes to the low-pressure engine on either side, where the same process is gone through, thence it finds its way to the condenser as in the ordinary type of marine engine. Now the reciprocating engine, with which almost everyone is familiar, is a far from perfect machine. Not more than 50 per cent. of the energy going into its help to drive the boat forward, but the propulsive co-efficient of the turbine is greatly in excess of that of the marine engine because of its more perfect form as every ounce of steam put into the turbine is helping to turn the shaft.

Another special feature in connection with the turbine machinery is the lubrication of the shaft, the oil being forced in at the bearings under pressure, and the speed of the engine is so great that it carries the oil with it round the shaft which is thus practically floating and revolving in an oil bath. Cases are numerous where the shaft having been exposed at the bearings after years of working have been found as dull as the day it left the makers' hands, with even the tool marks fresh upon it. This will give an idea how little wastage there is through friction, and suggests to the lay mind the smoothness and steadiness of the machinery.

With the old type of marine engine it is apparent to everyone that the hurling of a great weight like a piston and piston rod from one end of the cylinder to the other, and back again at an enormous velocity must be altogether unscientific, as it involves great loss of energy, great stress on the working parts, and considerable and distressing vibration. These have been overcome by the turbine, which bids fair to be the pioneer of a new era in ocean traveling. There is of course the fact the turbines cannot reverse, but in the *Victorian* reversing turbines will be enclosed in the low-pressure casings, and thus this difficulty is eliminated. It should also be remembered that the safety of a vessel depends not so much on its speed astern as on the power to stop quickly, and this turbine as designed is an extremely powerful engine in stopping because of the peculiar construction of the blades. Thus when the turbines are rotating in a contrary action to the steam which is passing through them, a turning movement is exercised two or three times as great as when the engines are running in the direction they are made for, whereas in the piston engine there is practically the same force whether the engine is going with the steam or against it.

The Motor Boat: Its Development and Field of Action.

BY ROBERT C. MONTEAGLE,
Member Society of Naval Architects and Marine Engineers.



35-FT. AUTOMOBILE BOAT; SPEED 18
MILES PER HOUR.

*Built by Gas Engine & Power Company,
Morris Heights, N. Y.*

forced the abandonment of all oar-propelled craft with a few notable exception. The motor boat of today possesses potentialities which loom up so large in the future that it would be premature to attempt their accurate prediction. The design of small motor boats has occupied the best minds of this country during the past fifteen or twenty years. The perfection to which they have been brought has been largely due to their untiring efforts. Up till two years ago a speed of 10 or 12 miles an hour was about the limit required in motor boats, and this was accomplished readily by the naphtha motor. In this motor naphtha is vaporized in a retort and used expansively in a three-cylinder engine with condenser and feed pump. The engine is reversible and is a very simple and effective machine. The rapid development of the automobile in Europe with its high-speed explosive engine resulted in the general adoption of the same, or similar type of motor in motor boats, and therefore the evolution of the "automobile boat" is notably one of the present. Today these boats are being driven at incredible speed. Two or three years ago no one would have believed that a 35-ft. boat could be driven 20 miles an hour, or that a 45-ft. boat could be driven 25 miles, and yet there are authentic cases where this has been done, and the end is not yet. To my mind there is a suggestion in this type of boat, well within the range of the possible, which might be of tremendous import to the navies of the

The development of the motor boat of today has been one of leaps and bounds, particularly during the last year or two, and as the automobile is rapidly superseding the horse in his legitimate usefulness, so the marine "motor" in its infinite variety has practically

ZAZA; 18 MILES PER HOUR
Built by H. J. Leighton, Syracuse, N. Y.



ADIOS; 24 MILES PER HOUR.
Built by H. J. Leighton

world. The infinite variety of motor boats and their concomitant variety of motors as they exist today are confusing to the average mind. Each of these individual boats and motors represents the concentered effort

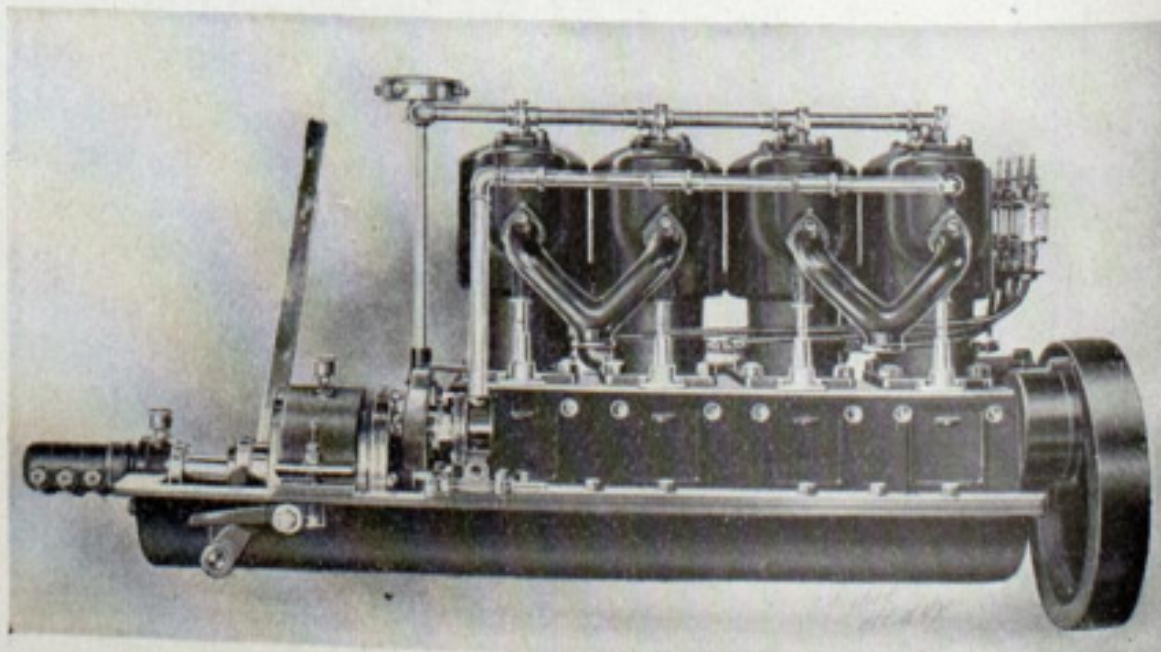
of individual or collective brains as the case may be, and it is a matter of regret that the efforts are not always worthy. We may, broadly speaking, place boats and their motors into three classes: First, pleasure craft; second, craft for commercial pursuits, and third, craft for naval purposes. In the first of these the requirements should be safety, lightness, comfort, speed and beauty, in the order named, or the combination of all. In the second, safety and carrying capacity, with all the speed available. In the third, safety, lightness, carrying capacity and speed. Common to all of these should be durability and the necessity for economy in the consumption



SPEED LAUNCH
Built by H. J. Leighton



KITTAWAKE.
Built by H. J. Leighton,



4-CYLINDER AUTOMOBILE BOAT MOTOR USED IN 35 FT.
18-MILE BOAT SHOWN IN ILLUSTRATION.

*Built by Gas Engine & Power Company,
Morris Heights, N. Y.*

of fuel. At a glance it may be seen, therefore, that the conditions governing the designs of the various types of boats are conflicting, and that, therefore, either one of the types mentioned must be at best a compromise. The most successful designer is he who can combine and arrange these conditions to the greatest advantage in any particular design upon which he may be engaged. There are cases where a builder is obliged to work from specifications which are crude in conception, and it is therefore no matter for surprise that the resulting product is somewhat crude. It may be accepted, however, as a truism, that no builder will ever succeed in constructing a boat of any description which will be satisfactory to *everybody in all its details*. The aim should, therefore, be to construct boats of the various types which fulfill their requirements, and which will be satisfactory to those who use them. With the foregoing in view, there is to my mind one consideration to be emphasized, viz.: the consideration that safety should not be sacrificed to speed. At the present time there seems to be a danger in this, particularly with irresponsible builders, who do not know the proper values of the workmanship, members, and material entering into the construction of boats. Boat building is a fine art, and ought to be approached in this light, whether for the purpose of building or buying. Unfortunately the great public does not always realize this, and in many cases the individual desiring to purchase a boat is entirely governed by the first cost, without proper regard to details of construction and form. In certain types of boats it is quite possible for the characteristics of safety, lightness and speed to coexist, providing that the design, workmanship and material be of the best. This may be said of the automobile boat. The logic that boats of the same type built by different builders are equally good seems to be accepted by many, although this is on a par with the logic that a book by one author is as good as a book by another, providing it be on the same subject. The experience, qualifications, equipment and personnel of the boat building plant must be taken into account in deciding where to buy a boat, if proper values are to be secured. It would be ill-advised to consider the automobile boat as the highest type of motor boat, but as her requirements for speed, power, and lightness are far in excess of any other form at the present time, she is undoubtedly the highest type with regard to these qualifications. As these boats must be strong, with the lightest possible scantlings, the most careful workmanship must be insisted upon in order that all the parts may be perfectly fastened together. Nothing but the best material should enter into their construction, and while the requirements of these boats do not lend themselves to decorative art, it is absolutely necessary that every appointment should be strong and symmetrical without regard to expense. All forms of automobile boats are modifications of the torpedo boat type, below the water line. Above the water line, the form which gives the greatest strength with the least possible weight, in combination with the necessary condition of seaworthiness, is the most desirable one. The draught of this type of boat varies very considerably between the two extreme conditions of rest and the highest speed, and the builders of these craft who do not take full advantage of this fact neglect a highly important factor of speed. The plane of flotation "entrance" should be designed to meet the conditions existing when the boat is under way instead of when at rest, as has been customary. I may now briefly review the field covering the "motor." The gasoline engine as it is used today is probably still in its infancy. Its possibilities are broadening so rapidly that the heretofore limited capacities of these motors are being augmented continually. There has been a decided lack of confidence in motors of this type until quite recently, and very properly so. Gradually their unreliability has been overcome, until at the present time it is no uncommon thing to have 100 H. P. units installed. Explosive engines have been used since 1860, that of Lenoir being the first practical engine.

During the first part of the stroke air and gas in proper proportions to suit combustion were drawn into the cylinder. At about half stroke the inlet valve closed, and the mixture was immediately exploded by an electric spark. The heated products of combustion then performed work on the piston during the remainder of the stroke, and were expelled during the return stroke. The engine was double acting, and the cylinder was prevented from becoming heated to excess by a water jacket, through which water was kept circulating. Chiefly because there was no compression in this engine, the heat absorbed by the water jacket bore an exceedingly large proportion to the total heat, and therefore the efficiency was low, about 95 cu. ft. of gas being used per horse power hour. Dr. Otto's engine, which appeared in 1876, was the first successful motor of the more modern type. It was a single-acting, single-cylinder, four-cycle engine—the cycle of the action extending through two revolutions. During the first stroke air and gas were drawn into the cylinder, during the return stroke the mixture was compressed, then ignited. When the explosion occurred the second stroke was begun, and during its accomplishment work was performed. The second return stroke was then made, which expelled the waste products of combustion. This engine had a water jacket, and the explosion was produced by a gas jet which was kept constantly burning. About 25 cu. ft. of gas was used per horse power hour. How nearly these conditions have been retained in the most modern types of explosive engines is well known. Improvements are to be looked for in perfection of detail, and excellency of workmanship, and no doubt in more radical departures as well. Originality and boldness of design have been notably exhibited in the Speedway motor at present exhibited at Madison Square Garden, New York city. This motor is the result of several years' experiments, combined with the most careful study, design and workmanship, and the result is highly creditable. The field of action of the motor boat embraces all the coasts, lakes and rivers of the world, without regard to nationality, race or color—truly a magnificent one. Aside from the grand possibilities of our own rivers, lakes and coasts, the balance of the world is open to our friendly commercial invasion. With the knowledge that our boats and motors compare most favorably with those of the world, let us proceed to the attack.

WORK AT CRAIG'S SHIP YARD.

Three or four steamers are waiting for the dock at Craig's ship yard, Toledo. Owing to the ice it is as yet impossible to move them. Concerning new work the steamer City of Benton Harbor is practically completed as far as her hull work is concerned and the company is now installing her machinery. She will be ready to launch just as soon as the ice gorge breaks. The steamer Indianapolis is well under way and will be ready to be launched inside of thirty days. The larger freighter under way is not very far advanced, but it is expected to have her in commission by Sept. 1. The steel tug will be launched as soon as the ice will permit it. The steam yacht, building for John F. Craig, will not be completed until the latter part of July. The company reports that it is figuring on several contracts for large ships and expects to be busy throughout the year.

Capt. John Hubbard of the Chicago fire department's steamer Illinois was instantly killed on Monday last while the steamer was battling with a fire in the Bullen malt house at the entrance to the harbor. The captain at the time of his death was standing on the forward deck when without any warning the excessive "water pressure" stripped the 3½-in. hose from the coupling at the connecting port, the hose and water with great force striking the captain and violently hurling his body against the windlass and anchors. Capt. Hubbard had been engaged as a tug man for the past thirty-five years. He was a great favorite with all.

SKETCH OF SAULT STE. MARIE CANALS.



THE POE LOCK.

der that its magnitude may be grasped. Probably some idea of the greatness of it may be appreciated when it is known that the total commerce of the great port of Liverpool, with its miles upon miles of magnificent docks, is only 10,000,000 tons per annum. To say that there were shipped along the great lakes in a single year 350,000,000 bu. of grain is a statement which the layman might take with a pinch of snuff and merely sneeze over. He must be informed that were he to dig a hole 40 ft. deep and 30 ft. wide, reaching from Cleveland to Buffalo, a distance of 225 miles, he could not get 350,000,000 bu. of grain into it. He would have something like 50,000,000 bu. left over. He must be told that the burning Suez has not one-quarter the traffic passing through it that passes through Sault Ste. Marie. Sault Ste. Marie, as a canal, is the commercial wonder of the world. This statement cannot be too often repeated because Sault Ste. Marie is located in a remote section of the country and people do not seem to understand its importance.

The Marine Review purposes a little later to go into the history of Sault Ste. Marie, and if it does not prove interesting reading it will not be the fault of the subject. Sault Ste. Marie has an industrial, commercial and human history that is of absorbing interest. Notwithstanding its remote location it is older than Detroit, and it is almost as old as Philadelphia, which is one of the oldest cities in this country. There has always been, as far as can be traced, a human habitation at Sault Ste. Marie. There was probably one at Sault Ste. Marie before Columbus discovered America. The reason is not far to seek. While the Indians are by nature a migratory lot, Sault Ste. Marie, in that rigorous climate, offered certain advantages as a permanent residence. The lakes might freeze over but the rapids never. If nothing else could be got to eat there was fish always available for the spear; and so when the first white man went to Sault Ste. Marie he found a little Indian village there and no one could remember when it had not been there. The white settlers married the Indian girls and introduced a sort of quasi-civilization into the place.

The commerce of Lake Superior, the mightiest body of fresh water in the world, was entirely cared for by the schooners Siscowit, Swallow and Algonquin. Little chaps they were,

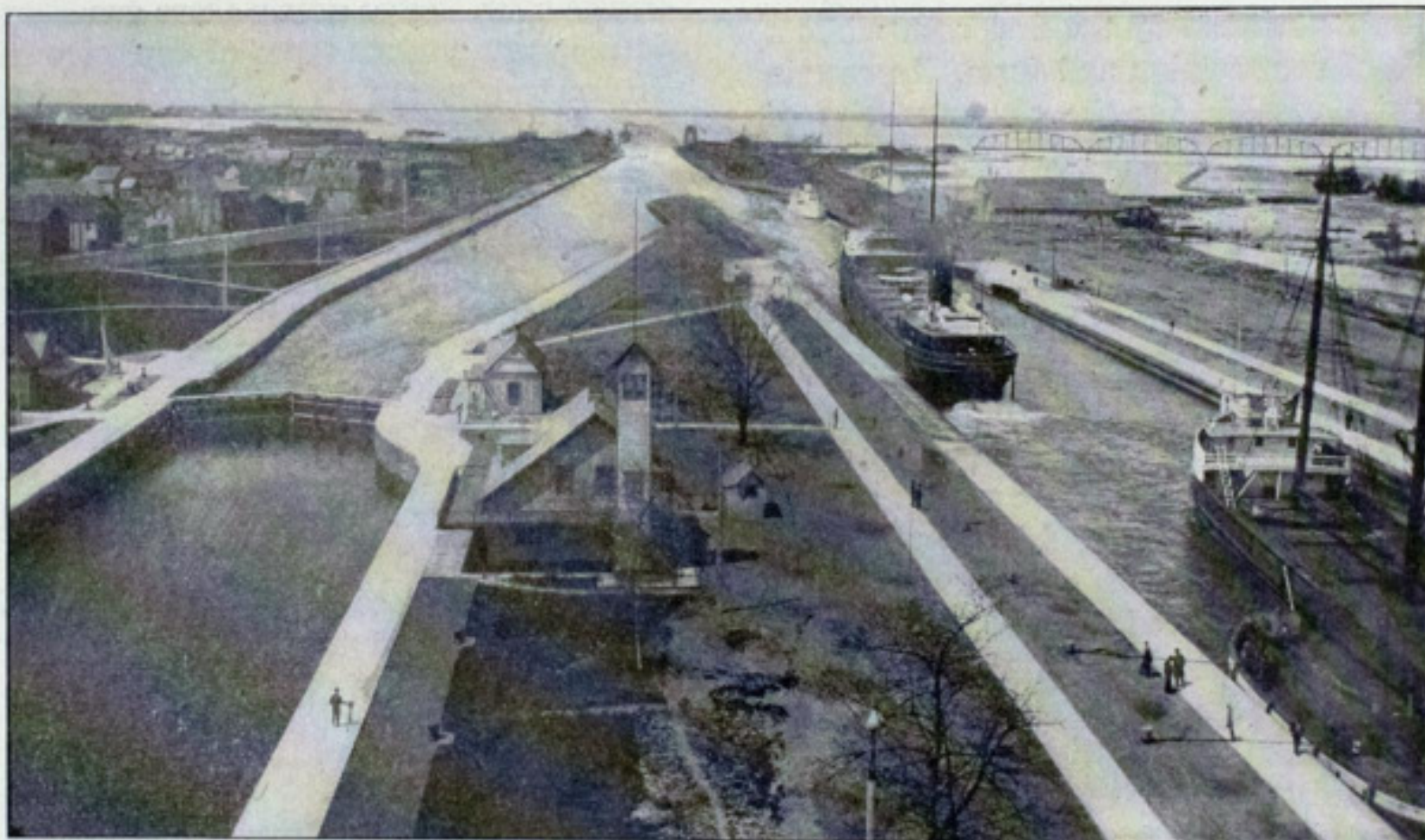
To say that 35,000,000 tons of freight passed through the canals at Sault Ste. Marie in a single year does not convey much to the mind of the layman. The simple statement must be illustrated in some way in order

not over a few tons, but they were big enough for all the commerce that was to be had. Such was the condition when, as is related elsewhere in this issue, iron ore was discovered in the upper peninsula of Michigan. Such was the primitive condition that obtained up to within nearly fifty years ago. To perceive how great has been the change within that brief space of time one has simply to look about him and to observe the great freighters moving like shuttlecocks in and out of every port on the lakes. The canal has wrought it.

There was a little lock on the Canadian side of the rapids as early as 1798. It was built by the Hudson Bay Fur Co. and was 38 ft. long, 8 ft. 9 in. wide, with a lift of 9 ft. A tow pass was made across the shore for the oxen to pull the batteaux and canoes through the upper part of the rapids. This lock, excepting its timber floor and miter sills, was destroyed in 1814 by the United States troops from Mackinac island. Of course this little canal never had any real commercial significance.

The first spadeful of earth for the construction of the first canal on the American side at Sault Ste. Marie was removed in June, 1853, by Mr. Charles T. Harvey, an engineer who is living yet. The original locks, of which there were two, tandem, were 350 ft. long, 70 ft. wide and 12 ft. deep. It was a big lock for the time, but so rapid was the growth of commerce that it

speedily became inadequate, but as is usual, additional facilities were not secured until long after they were needed. An additional lock was advocated as early as 1864, but it was not until 1881 that it was actually completed. This lock, known as Weitzel Lock, was 515 ft. long, 80 ft. wide and 18 ft. deep. The Dominion government built a canal on the Canadian side in 1895, with a lock 900 ft. long, 60 ft. wide,



GENERAL VIEW OF SAULT STE. MARIE CANAL.

with a depth of 22 ft. on the miter sills. In 1896 the Poe lock, 800 ft. long, 100 ft. wide and 21 ft. deep, was completed. Even this lock is now inadequate to the demands of commerce. No one dreamed of a freighter 560 ft. long even so late as 1896. Big as the Poe lock is, it is impossible to lock two modern carriers through it at the same time. Plans have now been formulated for additional facilities, but it is as true now as it was in the early days that they are secured only after the need for them becomes clamorous.

Senator Alger has introduced a bill in the United States senate to appropriate \$20,000 for the proper observance of the semi-centennial anniversary of the completion of the first canal at Sault Ste. Marie, which will occur in June of next year. It deserves to pass.

The Northern Michigan Transportation Co. of Chicago, is building at South Chicago, the new steel steamship Missouri, which will be delivered June 1. Some minor changes are also being made in the steamer Illinois at South Chicago. The steamer Charlevoix is undergoing a rebuild at Manitowoc and will be ready for business by April 1. This steamer will hereafter be known as the Kansas.

NEW STEAMERS FOR THE UNITED FRUIT CO.



PORT ANTONIO, JAMAICA.

carrying trade. The ships, which will be nearly double the tonnage of any vessel now engaged in the trade, will be equipped with refrigerating machinery of the most approved

construction and of sufficient power to maintain the necessary low temperature in the cargo chambers in tropical climates. By the system of insulation with which each ship will be provided the air is kept circulating throughout every part of the fruit space, passing on each round over pipes through which cold brine is constantly pumped. The refrigerating power will insure the preservation of perishable cargoes for many days and will enable the transportation of fruit for great distances. The steamers will be about 4,500 tons gross each, and while primarily intended for the carriage of fruit they will be fitted for other cargo as well, and will have luxurious accommodations for a number of

In order to meet the requirements of its constantly growing business the United Fruit Co. has recently placed a contract with Workman, Clark & Co. of Belfast, Ireland, for the construction of three large steamers which will be a distinct departure from anything now engaged in the fruit

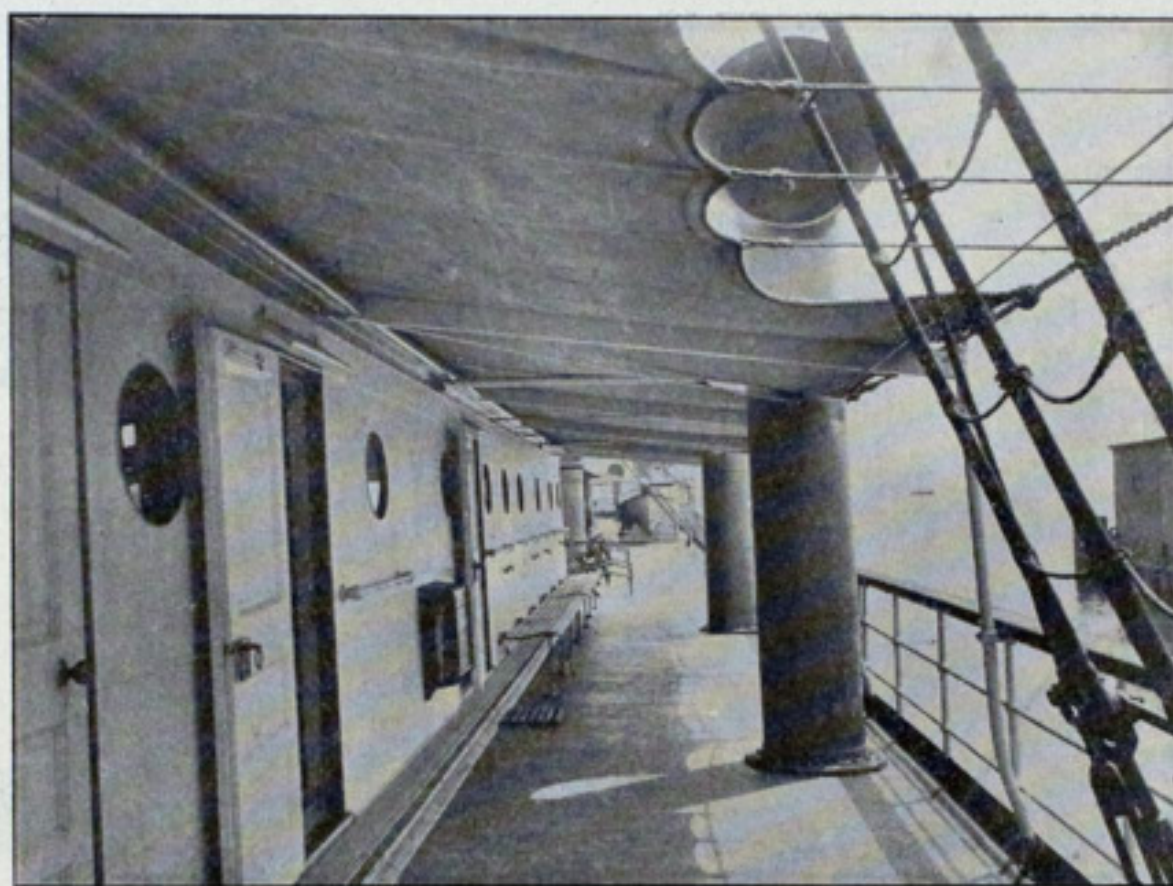
first-class passengers. The steamers will be built to the rules of the British corporation registry, and will be modern, up-to-date crafts, with all the latest devices for the rapid handling of cargoes. For experimental purposes the fruit company's steamer Venus, plying between Central America and New Orleans, has been recently fitted with a complete refrigerating outfit and the system has been pronounced a complete success. The system of insulation is somewhat similar to that in use on the company's steamers engaged in the trade between Jamaica and England and by means of which it is possible to transport fruit from the West Indies to England in excellent condition.

The first of the trio of new boats will be ready for delivery about the middle of June, and the others will follow at intervals of four weeks. The dimensions of the steamers will be: Length, 330 ft.; breadth, 44.3 ft., and depth of hold, 31.3 ft. They will have a capacity for about 45,000 bunches of bananas, and will be assigned to the service between Port Limon, Costa Rica, and Boston. The passenger accommodations will all be amidships on the spar and bridge decks. The ship building firm which has secured this important contract also constructed

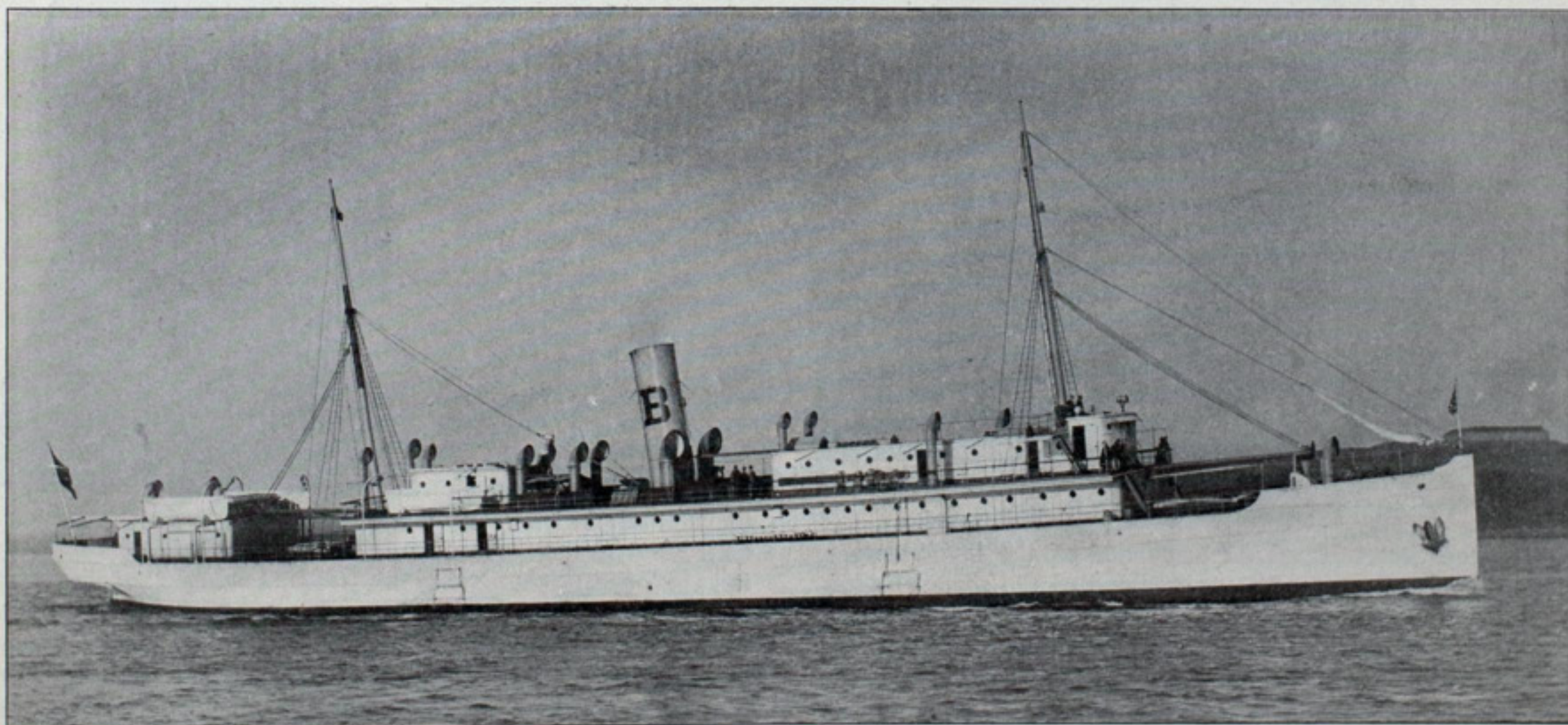
some of the first steamers operated between Boston and Jamaica in the banana carrying trade, among them the Ethelwold and Beverly. Since then the business has grown to such proportions that steamers the size of European liners are now required to properly take care of the business.

The growth of the fruit business between the West Indies and Central America and the United States has been phenomenal. Having its origin in 1872, when a few schooners of small dimensions were operated between Jamaica and Boston, the business has developed to such proportions that the

United Fruit Co. now own or control by long term charters a fleet of sixty-two steamers.



PROMENADE DECK ON THE ADMIRAL DEWEY.



STEAMER ADMIRAL DEWEY OF THE UNITED FRUIT CO'S FLEET.

MARITIME DISPLAY AT WORLD'S FAIR.



"SPIRIT OF THE ATLANTIC,"

By Konti.

all the ships belonging to our navy. The Naval Academy at Annapolis has prepared a fine exhibit. There will be photographs of the improvements made in the buildings at

The plan of the exhibit of the navy department at the Louisiana purchase exposition is completed. Chief Clerk Peters has given his personal attention to every detail and has originated some striking new features. One of these is the model of a dry dock, something never before exhibited at an exposition. The most notable new feature of the navy exhibit will be the deck of an American man-of-war. This occupies much of the floor space. Visitors can examine every part of this reproduction of a battleship. There are two entrances to this interesting miniature man-of-war. There will be small models of nearly



"TRANSPORTATION BY WATER." By Zolnay.

the United States Naval Academy and of the many attractive places in the grounds. At one end of the space allotted to the exhibit of the navy department will be a dark room in which various moving pictures will be displayed showing naval maneuvers of all sorts. The maneuvers of the squadron in the Atlantic ocean were successfully photographed and will be exhibited among these motion pictures.

Noteworthy among the statuary at the fair will be Zolnay's

heroic figure of transportation by water is especially beautiful, there being great calmness and dignity in the face of the figure and wonderfully flowing lines in the drapery. Konti's conception of the Spirit of the Atlantic is especially inspiring, spirit of the Atlantic is especially inspiring, embodying great powers of both conception and execution, and



"FISHERIES," By Konti.

being especially dramatic in its effect. The fisheries design is also very effective, as is also the design devoted to the twin subjects of commerce and navigation.

The fair is to open on April 30 and a bird's eye view of the sight causes the observer to express surprise at the forward state of everything pertaining to the enterprise. He sees the central picture almost as it will be when the fair is opened. The palaces of varied industries, machinery, manufacture, mines and metallurgy, education and electricity, liberal arts and transportation need little if anything to place them in readiness. The Colonnade of states has become a magnificent reality, and immediately in its central front rises the Festival Hall, whose massive dome reaches skyward 200 ft. and is larger than any in the world. Behind the Colonnade, clothed in architectural magnificence, is the permanent art building of white stone. One sees the lagoons completed and also the ways where great cascades will leap down the terrace. And in an equally advanced stage is the second picture, which has the giant Palace of Agriculture as its central figure, with the palaces of horticulture and forestry, fish and game as noble adjuncts.

"COMMERCE AND NAVIGATION,"
By Konti.

One sees the lagoons completed and also the ways where great cascades will leap down the terrace. And in an equally advanced stage is the second picture, which has the giant Palace of Agriculture as its central figure, with the palaces of horticulture and forestry, fish and game as noble adjuncts.

GEN. ALEXANDER MACKENZIE.

When Dr. Johnson completed his celebrated dictionary he sent a copy of it to an old woman who had been a friend of his over a long series of years. She replied, after a great length of time, that she had enjoyed the book very much, but thought the narrative disconnected. To read the mere skeleton of any man's biography is very much like reading a dictionary. Hew as born on such and such a date, spent such and such an amount of time here and there, occupied such and such positions, and then a convenient blank is left for the date of his final taking-off. The mere chronological record of a man's life, the mere history of his achievements, conveys no idea whatever of his character. In looking through the war records for a sketch of Alexander Mackenzie, one runs across such intensely fascinating matter as this:

"Willets Point, N. Y., Nov. 9, 1868, to June 22, 1874; assistant engineer of repairs to Louisville and Portland canal and improvement of the falls of the Ohio river at Louisville, Ky., June 27, 1874, to Nov. 22, 1877."

A little of such reading goes a very long ways, indeed. It is very much like reading a report of the department of public works. The human element is entirely extracted. Gen. Alexander Mackenzie is one of the most delightful men that has ever lived. His character has a charm that is too intangible for words. He is less like a politician than any man who has held public office. There is no such thing as self-aggrandizement in him. It took him over twenty years to reach the rank of captain. He has done the day's work as each day dawned, and has chosen rather that office should seek him than that he should seek office. It is, therefore, an especially brilliant commentary on his ability that the office of brigadier general and chief of engineers of the war department should have been bestowed upon him without his ever having so much as lifted his little finger to get it. Alexander Mackenzie is one of nature's gentlemen, gentle yet firm, reserved and yet approachable, dignified without being ostentatious.

This is the bald record of his life: He is a native of Wisconsin. He entered West Point Sept. 1, 1860, and graduated June 30, 1864, and was immediately promoted to the rank of first lieutenant, corps of engineers. He served as assistant engineer in the department of Arkansas during the last stages of the civil war and was breveted captain on March 13, 1865, for gallant and meritorious services during the rebellion. At the close of the war he was employed in an examination of the levees of the lower Mississippi and in certain improvements in the harbors of Lake Michigan. He was promoted to the rank of captain on March 7, 1867. His active service as captain was largely confined to the improvements of the Ohio and Mississippi rivers, and on April 5, 1882, he was promoted to the rank of major, still continuing in charge of river improvements in the Mississippi valley. He was made a member of the Missouri river commission in 1884, and served upon it as well as various other boards for ten years. He was

made lieutenant colonel Feb. 3, 1895, and appointed to the office of first assistant to the chief of engineers. He reached the rank of colonel in 1901. He gave considerable attention to the work of military reconnaissance of the entire Hawaiian archipelago. He was made chief of engineers with the rank of brigadier general on Jan. 23 of the present year.

FORCEFUL SPEECH FOR AID TO SHIPPING.

Important meetings were held in Washington recently to discuss two measures at present before Congress concerning American shipping. One of these confines the forwarding of government supplies to the Philippines to American bottoms. The other extends the coastwise laws of the United States to the Philippines. Mr. S. S. Sewall of the firm of Arthur Sewall & Co. of Bath, Me., appeared before the committee and said that rates were now so low on the Pacific that tonnage to the amount of 140,000 is lying idle in San Francisco harbor. The condition of affairs he ascribed to the cutting of rates by the French sailing vessels which received such large subsidies from the French government that they can sail half around the world in ballasts. The bounty pays the cost of operating the vessel, and almost all of the insurance as well, so that whatever is paid for freight is profit to the owner. Mr. Alfred Winsor of Boston, president of the Boston Steamship Co. which is now operating five ships in the oriental trade, says that what American steamers want is a greater volume of freight in preference to an increase of rates. He thought this could be obtained by limiting the commerce to American ships.

One of the most earnest pleaders for the extension of the coastwise laws to the Philippines was Mr. Herman A. Kelley of Cleveland, representing the American Ship Building Co. He told the committee on merchant marine and fisheries the disastrous results which followed the attempt of the lake shipping interest to enter the ocean carrying trade. Lake interests built two large steamers (the Minnetonka and the Minnewaska) at Cleveland and floated them in two pieces to Quebec, where they were joined. These two steamers now lie dismantled at Brooklyn, because they could not get freight at anything but a loss. "This is the result of our attempts to do something for the American marine" said Mr. Kelley, "an investment of \$800,000 lying idle for nearly two years and depreciating every day. Every other interest in the country has received some of the benefits of protection. Ship building alone has been exempted. Whenever we come to congress we are met by large protected interests and we are asked to sit in the background with most humiliating results. It is very singular, if there is insufficient tonnage, that we cannot find anything elsewhere for our ships to do. Secy. Taft has urged us to wait. We don't want to wait. We want immediate relief and instead of seeing our commerce to the Philippines carried in foreign ships, we want to see it carried under the American flag."

The most forceful speech of all was made, however, not by



GEN. ALEXANDER MACKENZIE, CHIEF OF ENGINEERS.



MISSISSIPPI RIVER STEAMBOAT ROBERTA.

[Built at Howard's Ship Yard, Jeffersonville, Ind.]

trained lawyers, not by ship builders but by an everyday workman. The rude eloquence of Donald Crawford of Baltimore, representing the Brotherhood of Boilermakers & Iron Ship Builders, and pleading the cause of American workmen in the ship building business, swept the members of the committee and the spectators from their feet and at the close of his remarks the applause lasted for several minutes.

Trained in the ship yards along the Clyde, Crawford had worked in the American yards on the Pacific, on the Atlantic and on the great lakes, and his appeal in behalf of his fellow-craftsmen, couched in simple language and flavored with a strong Scotch "burr," went straight to the hearts of his auditors. The bill under discussion was that which confines the extension of the coast-wise trade laws to the transoceanic trade between the United States and Philippines, exempting the interisland traffic.

"As American workmen building ships," said Crawford, "we are practically obsolete. I am proud of the history of the American merchant marine, but am humiliated to think of its downward course of late years. At the plant of Arthur Sewall & Co. of Bath, Maine, it was my pride and pleasure to work on the first steel sail ship built in an American yard. Now I am humiliated to know that the plant is tied up and that the rust is eating up the machinery. Look for the Merchant Marine building at Sparrow's Point; there is not a microscope powerful enough to find it. The ship yards are depending on Uncle Sam for a bare existence. At Newport News you are building naval vessels of the first class, to protect what? Not our commerce, for we have none."

Mr. Crawford criticised Senator Gorman's course in favoring internal improvements in preference to a navy. "We have 20,000 men belonging to our brotherhood walking the streets cleaning bricks at a dollar and a quarter a day, when, if given a chance to exercise their art, they would be receiving three dollars and a half a day. I listened with much interest to Governor Taft—he was so interested in the 'little brown man.' He has been under the atmosphere antagonistic to pure American sentiment. Are the American mechanics of today to be sacrificed to the 'little brown man?' I have

heard the howl of the cordage trust, which has destroyed cordage factories. They have made millions since the occupation of the Philippines. Shame to you and to me, it is, that American goods go in British tramps or French subsidized vessels.

"It is a unique spectacle," continued Mr. Crawford, "to see labor coming to congress to plead the cause of capital. I hope in the future capital and labor will co-operate, so we can build ships as cheap on this side of the water as on the other. Give us the work and it will stimulate our pride where now we have to hang our heads in shame.

"It seems that everything is being done to prevent the American flag from floating on the seas," continued Crawford in a pathetic tone. "You are voting today on the naval bill providing for great battleships and cruisers not equaled by those of Johnny Bull himself, to guard what? Not our commerce, for that is carried in foreign bottoms. We talk about being a world power on the seas," he added, sarcastically, "when 90 per cent. of our commerce is under foreign flags. You are spending millions of dollars in dredging channels and harbors and building docks so that foreign vessels can come in and carry our commerce. You would not have us degrade ourselves, wear poorer clothes, live in poorer houses and eat cheaper food so that we can compete with the foreign workmen, would you? If you would then you would crush us and we would never have the aspirations of true citizens.

"Go along the great lakes from Buffalo to Duluth. On the Canadian side you see bleak shores; on the American side populous cities. Why? Because the carrying trade of the lakes is fully protected. But what do you find on the coast? You find American shipping entirely at the mercy of foreign subsidized vessels. I appeal for sympathy not only for the 'little brown men,' but for the 20,000 American mechanics seeking work in American ship yards."

Mr. Crawford was heartily congratulated by members of the committee and others present after the applause had subsided.

CAPT. JOHN W. COLLINS.

One of the most agreeable men in the public life of Washington is Capt. John W. Collins, the engineer-in-chief of the United States revenue cutter service. He was born in New York city on Jan. 29, 1845. After attending the public schools of his native city and serving an apprenticeship in the shops of the South Brooklyn Steam Engine & Boiler Works, he was at the early age of nineteen years appointed as a third assistant engineer in the United States navy and at once assigned to duty on the United States frigate Wabash. While attached to that vessel he saw considerable active duty and took part in both battles of Fort Fisher. He was subsequently transferred to the gunboat Tacony, which vessel was engaged in duty in the sounds of North Carolina until the close of the war. Receiving an honorable discharge from the volunteer navy he was commissioned a second assistant engineer in the revenue cutter service on April 7, 1866. He rapidly rose through the various grades in this service until he was made a chief engineer on July 18, 1878. In the revenue cutter service he has performed active duty on many of its vessels stationed on the North and South Atlantic coasts, and on the lakes. He was, during this period, twice assigned as chief engineer of the cutter Andrew Johnson, stationed at Milwaukee, Wis., and is therefore well known to many people along the Great Lakes. Up to January, 1892, the position of consulting engineer of the service has been filled by an engineer in civil life. Chief Engineer Collins was prior to that time engaged in duties as an engineer member of the International Marine Conference. So well were these duties performed that Secretary Foster selected him from the entire list of chief engineers of the service and detailed him as consulting engineer, which thus made the subject of this sketch the first officer of the service to hold that responsible position. This selection was subsequently ratified by the act of Congress approved July 31, 1894, creating the position of engineer-in-chief of the service. The work of this office was so greatly increased on account of the building of new vessels that Congress, in 1897, created the grade of captain of engineers, which carried with it the pay and emoluments of a captain in the line. President McKinley appointed Capt. Collins to this new position on July 26 of that year. He thus became the first marine engineer in the employ of the United States government to have what is commonly known as positive rank, a desideratum long striven for and subsequently attained by the engineer officer of the navy.

At the time Captain Collins was made the consulting engineer of the service there was not revenue cutter afloat having a triple-expansion engine, although at that time this type had been almost universally adopted in the merchant service. The first machinery constructed under his directions, that of the Hudson, was fitted with a triple-expansion engine and a water-tube boiler. This, it will be remembered, is the vessel which performed such gallant and meritorious service at the battle of Cardenas, when she rescued the torpedo-boat Winslow from almost certain destruction by the Spanish batteries.

Since his incumbency of this office he has supervised the designing and construction of the steam machinery of twenty-one new revenue cutters, varying in size from 250 to 1,500

tons displacement, and from 650 to 2,700 I. H. P. In addition to his duties in connection with the design of the steam machinery, the engineer-in-chief also has charge of the designing and installation of the heating, ventilating, electric lighting, steam steering, anchor hoisting and sanitary systems on all vessels of the service, as well as the inspection of all metals entering into the construction of the new vessels.

Besides the immediate work in connection with his office, Capt. Collins has been detailed for numerous cases of professional duty outside of the service, and has, at various times, served as one of the three judges at the American Institute Exposition; as the engineer member of a board to revise the rules of the Steamboat Inspection Service; a member

of the advisory council of the engineering congress held during the World's fair at Chicago; a member of the council of the American Society of Naval Engineers, etc., etc. As a veteran of the civil war he was elected to active membership in the E. D. Wolcott Post, G. A. R., at Milwaukee, and recently has been elected an honorary member of the Philadelphia Association of Naval Veterans. At the last annual convention of the National Marine Engineers' Beneficial Association, he, in company with Admiral Rae, the engineer-in-chief of the navy, was elected to honorary membership in that association. Capt. Collins has the friendship of a large number of prominent statesmen and men in public life, and it is largely through his indefatigable efforts that congress enacted the recent legislation giving to officers of the revenue cutter service a retired list and pay equivalent to officers of corresponding rank in the army and navy.



CAPT. JOHN W. COLLINS.
Engineer-in-Chief, Revenue Cutter Service.

FITTING-OUT AT CHICAGO

Chicago, March 9.—With the smallest winter fleet Chicago has seen in years, the ship yards here are not being rushed to get boats ready for the coming season of navigation. With the outlook for an unprofitable season before them, owners do not seem anxious to expend much money on their craft. Estimates of the total cost of repairs at both Chicago and South Chicago during the winter put the figures at \$250,000, although they may fall below. Of the vessels engaged in general lake trade laid up in Chicago river, excluding the smaller lumber carriers, the number is but a little more than one-half that of the fleet of two years ago. The decrease is shown by the following figures: Winter of 1901-2, fifty-four steamers and twenty-eight barges; 1902-3, forty-five steamers and eleven barges; 1903-4, thirty-five steamers and fourteen barges. At South Chicago the fleet of thirty-five ships is about the same as in previous winters.

Probably the most extensive repair job now under way is that of the steamer Nyanza at the Ship Owners' drydock in the north branch. It is said to be one of the largest wooden jobs ever done in Chicago, if not on the lakes. When the work was started it was not expected to amount to much, but as the tearing to pieces proceeded it was found necessary to give the boat almost an entire rebuild. Fourteen strakes of new plank have been put in clear around the hull, and a new flush deck put on, raising the latter 4 ft. There is almost a complete rebuild forward, twenty-four new strakes of plank going on the starboard bow and twenty-eight on the port bow. All new frames are being put in the upperworks, a new ceiling aft, and the vessel will be entirely recalced. The Nyanza is owned by James McBrier of Erie, and is said to be

one of the best money-makers of her size on the lakes.

Other work at the Ship Owners' plant is as follows: Steamer Jesse Spalding, repairs to ten or twelve bottom plates; P. D. Armour, bottom calking and general repairs; T. W. Palmer, repairs to stern and new floor; Major, new hatch combings and general work; Black Rock, general repairs; Ravenscraig, repairs to bottom plating and four or five new frames; City of Paris, general repairs; Parks Foster, Ira Owen and P. P. Pratt, general repairs; N. J. Nessen, Mueller, City of Marquette, Empire State, fireboats D. J. Swenie and Illinois, in drydock for general repairs. Of the railroad line fleet, the Seneca of the Lehigh Valley Line has received repairs to her bottom plating and the Tuscarora, a new pilot house, foremast and general repairs. The Anchor liner Schuylkill was in dry dock for repairs to the stern bearings, the Conemaugh has received new upperworks and the Susquehanna has received minor repairs. Only small work has been done to the Auburn, Arabia and Syracuse of the Western Transit Line. The McVittie, James and Langdon of the Rutland Line will not require much work. The Chemung and Owego of the Union Steamboat Co.'s fleet will receive new anchor davits, and the latter some repairs to bottom. Considerable work will have to be done to the bow of the barge Harold, which was in collision at the Sault, but the survey has not yet been held. President R. J. Dunham states that his company has considerable other work in prospect before the opening, the details of which will not be known until the vessels are at the ship yard.

At Knudson, Jenks & Co.'s ship yard on the north branch steel arches are being put in the steamer S. M. Stephenson, formerly a tow barge. The boat is also being calked all over. The steamer Thomas Cranage is receiving new side planking, new floor and calking all over; steamer Madagascar, some new planking and calking; steamer Cuba, all new upperworks and general repairs; barge Annie M. Peterson, new stern, the result of a collision with the steamer Niko; steamer W. M. Eagan, general work. Repairs on the steamer Niko, consisting of a new stem and some new sides, will be done later.

At the Chicago Ship Building Co.'s plant on the Calumet river the largest contract for repairs is that on the steamer W. L. Brown, which was on the rocks of Lime Kiln crossing last fall. Thirty-six bottom plates had to be taken off, repaired and replaced, and thirty plates were faired in place. Twenty-five pairs of broken frames were repaired, stern bearings refilled, new wales put on all around. The steamer also received a new wheel and repairs to machinery. The Canada Atlantic liner Arthur Orr, which was strained in a blow in November, had twenty-six topside plates taken out and repaired, ten plates faired in place, thirty pairs of broken frames repaired, and the sheer-strake doubled over the gangways. She also received new steering cables, new stern brackets and repairs to boilers and engines. Following is other work at the yard: Steamer J. R. Langdon, machinery repairs; Scranton, repairs to shoe and bottom; Wawatam, new bow from 12-ft. line down, repairs extending back to collision bulkhead; Capt. Thomas Wilson, main deck altered to suit clamshell unloading apparatus and repairs to bottom; Illinois, repairs to hull; James Watt, new bow from 16-ft. line to deck, result of collision at Conneaut; Saxon, new steel spars and repairs to frames. Fourteen steamers of the Pittsburgh Steamship Co. are laid up in the Calumet, and all will receive minor repairs during the winter.

Since the launching of the steamer Duluth of the Western Transit Line in November, the only new work at the yards has been the building of the passenger steamer Missouri for the Northern Michigan Line. Supt. A. J. Smith states that this vessel is now ready to launch at any time, but owing to

the heavy ice in the river and slips tugs have been unable to get to the ship yard to remove boats which are in the way. The Missouri is to be ready for service May 15.

At the repair yard of the Great Lakes Towing Co. Supt. Thomas Johnson has given a number of boats of the local fleet extensive repairs. The Dickinson has received new upperworks and steel deck frames; Monitor, new decks and upperworks; Perfection, general hull repairs; Protection, new planking, frames and new decks. The Morford and Hackley, which have been engaged in the crib work, have both been in for repairs as the result of their ice-bucking.

Hardly any work is being done on passenger steamers in Chicago harbor, most of the boats laying up for the winter at other ports. At Benton Harbor the Graham & Morton Line is remodeling the Holland, formerly the City of Milwaukee, which will give the boat sixty additional staterooms on the upper deck. The cabin of the Argo is being remodeled from amidships aft, increasing its width from 11 to 16 ft.

WORK AT CLEVELAND AND LORAIN.

Considerable repair work is under way at the Cleveland yard of the American Ship Building Co. Contract has just been received to lengthen the steamer Republic 72 ft. and to make other changes in her that will cost about \$70,000. The Republic is 292 ft. long and the addition will make her 364 ft. long and give her three more hatches. She was built for the Republic Iron Co., but was sold two years ago to the Cambria Steel Co. When she comes out she will virtually be a modern steamer with 50 per cent. more carrying capacity than she has at present. The Wm. E. Reis, which broke from her moorings during the flood in the Cuyahoga river last year, will have her boilers changed. Two new boilers will be put in her and her engine cylinders reduced in size. The purpose of this is to reduce her power, which is greater than is necessary, and consequently to economize in fuel. The same process will be done to the steamer Hanna, also belonging to the Mitchell fleet. A new boiler will be installed in the Louisiana and also new cylinders for her fore-and-aft engine. The whaleback No. 201 will have a new boiler placed in her. The steamer James H. Eads, belonging to the Steel Corporation, will have her boilers rebuilt and new furnaces put in complete. Her stern, which was also broken when she ran away from her moorings with the Reis and Moore, will also have to be repaired. Repairs to her will cost about \$3,000. It is estimated that it will require about \$20,000 to repair the John W. Moore, as her bottom needs extensive rebuilding. The steamer Mary McGregor is having a new boiler put in and undergoing other repairs that will cost about \$10,000. The steamer H. D. Coffinberry is in No. 3 dock having a new stern put on at a cost of about \$8,000. The Burrows is in dock No. 2, undergoing calking and replanking. The tug Henry is being overhauled including repairs to her hull and the installation of new boilers.

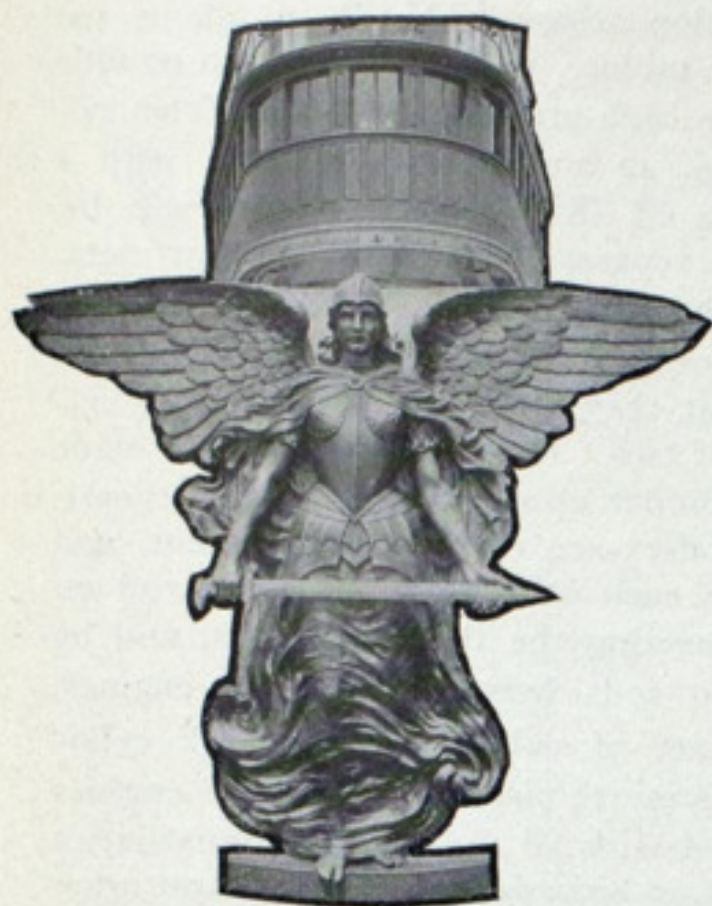
At Lorain the steamer Henry Steinbrenner is having new plates put on and undergoing repairs to her stern bearing. The boilers of the Robert Fulton are being rebuilt and new furnaces put in. The Holden and the Peck which were carried away in the flood at Lorain during January, will be taken to the dock as soon as the sunken dredge, which now obstructs navigation, is removed from the river.

As far as new construction is concerned, the Lorain and Cleveland yards are well up with their work. There are only two steamers on the stocks at Cleveland and one in the water, and there are only two on the stocks at Lorain and also one in the water. The ones on the stocks at Lorain are of primal importance, being the 560-footer for Capt. A. B. Wolvin and the 494-footer for George Tomlinson of Duluth. The Wolvin steamer will be launched some time in April.

Latest Battleships Mississippi and Idaho.

BY W. F. SICARD,

Bureau of Steam Engineering, Navy Department.



BRONZE VICTORY ON BATTLESHIP

MASSACHUSETTS

[Copyright by W. H. Rau.]

Bids for two new first class battleships, the Mississippi and Idaho, Nos. 23 and 24, were opened at the navy department, at noon, Jan. 15. These vessels were a part of the lot appropriated for by an act of congress, approved March 3, 1903, the other battleships being the Vermont, Kansas and Minnesota, Nos. 20, 21 and 22. The contracts for the Vermont class, of 16,000 tons displacement, were let last year and they are now under construction. The Miss-

issippi class, however, are quite different in design. Their displacement is but 13,000 tons and the problem was to get, on this limited displacement, armor and armament sufficient to make them, as is usual with United States men-of-war, superior in offensive and defensive qualities to foreign vessels of the same class. When one notes that the combined weight of armor and armament on these vessels is 34.72 per cent. of the trial displacement some idea can be gathered of their fighting qualities.

The general dimensions of the vessel are as follows: Length of load water line, 375 ft.; breadth, extreme, at load water line, 77 ft.; displacement on trial, not more than 13,000 tons; mean draft to bottom of keel at trial displacement, 24 ft. 8 in.; mean gross draft, full load, about 27 ft. 1½ in.; total coal bunker capacity, about 1,750 tons; coal carried on trial, 600 tons; feed water carried on trial, 40 tons.

The circular inviting bids was issued from the navy department under date of Nov. 7, 1903. The requirements were for ships of 13,000 tons trial displacement, to make a speed of 17 knots an hour for four consecutive hours over a measured course; also an endurance trial, under all boilers, of 24 hours' duration in the open sea, at an average of not less than 6,400 I. H. P. The vessels were to be completed in forty-two months.

The penalties under which the ships are to be built are as follows: For failure to complete the ship within contract time, \$300 a day for the first month succeeding contract time and \$600 a day thereafter until completed. For failure in speed: If the speed is below 17 knots and exceeds 16¾ knots an hour, \$50,000 a quarter of a knot; if below 16¾ knots and exceeds 16½ knots, \$10,000 a quarter of a knot while, if it falls below 16½ knots the vessel may be rejected. As stated in the opening paragraph, the bids were opened Jan. 15, 1904, and were as follows:

	One ship	Time	Two ships	Time first	Time second
		mos		mos	mos
Newport News S. B. & D. D. Co.....	\$3,147,000	37			
Wm. Cramp & Sons' S. & E. B. Co.....	3,200,000	39	\$2,999,500	38	40
Fore River Ship & Engine Co.....	3,468,000	42			
Maryland Steel Co.....	3,472,000	42			
N. Y. Shipbuilding Co.	3,500,000	42	(each)		

Both vessels were awarded to the Wm. Cramp & Son's

Ship & Engine Building Co., of Philadelphia, the lowest bidder.

The hull is to be of steel throughout and all parts of the vessel, machinery and equipment are to be of domestic manufacture. In general appearance these vessels will be somewhat similar to the Iowa, being cut away aft, the forward turret being one deck higher than the after turret. There is one steel mast, arranged for wireless telegraphy and having two tops, a crow's nest, a search light platform and a signal yard. There is a lower bridge forward and aft and a flying bridge forward. The flying bridge has a bronze screen for the protection of the men at the wheel and there is a bronze chart house.

There are steering stations with steam steering wheels on the flying bridge, in the conning tower, in the communicating room, and in the steering engine room, at which latter station there is also a hand steering arrangement.

There is one turret on the upper deck forward and one on the main deck aft, each on the centre line of ship and containing two 12-in. breech loading rifles. At each of the four corners of the superstructure there is a turret, containing two 8-in. breech loading rifles. All turrets are balanced and elliptical and are electrically controlled; their ammunition is supplied by electric hoists leading directly from the handling rooms, or ammunition passages, to the turrets.

In addition to the guns in turrets, there are eight 7-in. breech loading rifles, in broadside, on the main deck. These guns are protected by 7-in. armor and each pair of guns is isolated by transverse nickel steel bulkheads 1½-in. thick. There are eight 7-in. ammunition hoists supplied by four horizontal electric conveyers. The 7-in. broadside guns are so arranged that their muzzles train inside the line of side armor, leaving the side of the vessel unobstructed.

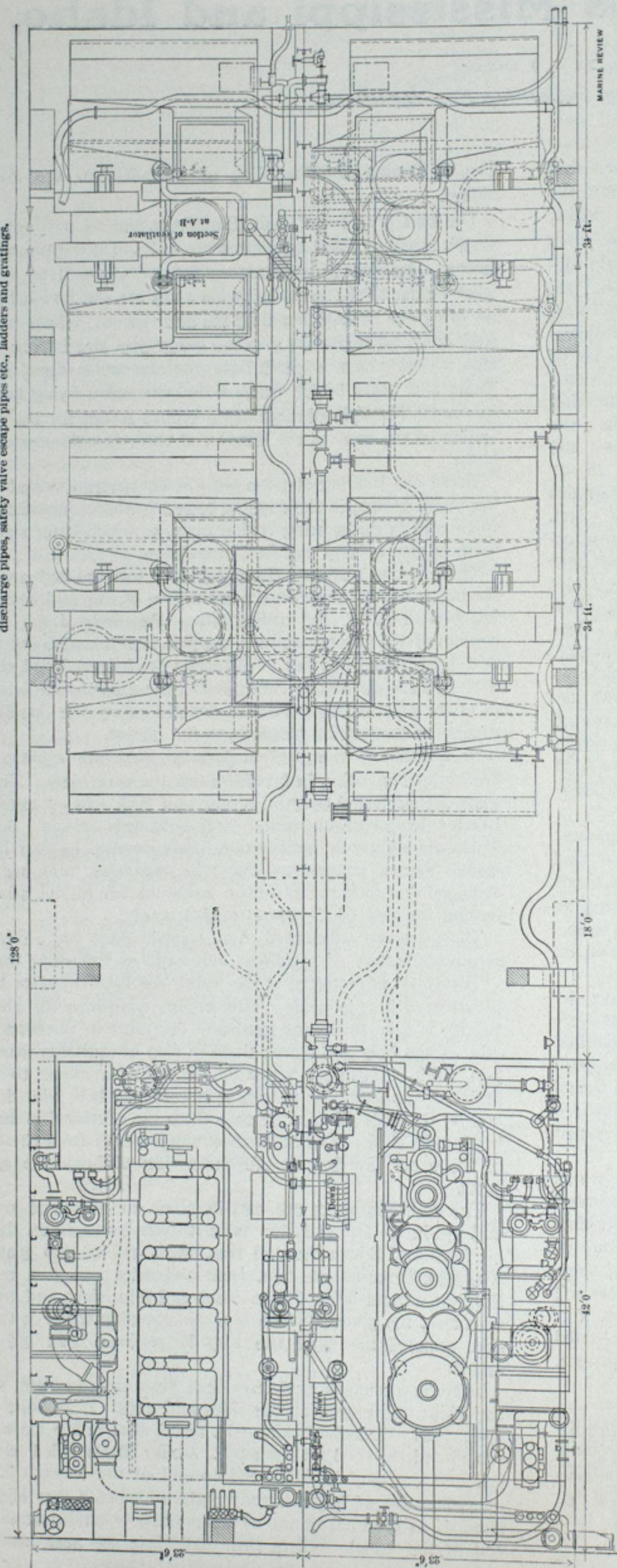
There are two submerged 18-in. torpedo tubes and a strong secondary battery of rapid-fire, automatic and machine guns.

The vessel is protected at the water line by a complete belt of armor 9-ft. 3-in. wide. This armor, amidships for about 244 ft., is 9-in. thick, and gradually decreases in thickness to 4-in. at the bow and stern; there is also athwartship armor, 7-in. thick. Above the water line belt and extending to the limits of the magazine spaces, is a casemate belt 7-in. thick and, at the ends of this casemate there are athwartship bulkheads 7-in. thick. The casemate armor extends from the top of the water line belt to the under side of broadside gun ports.

The 12-in. barbettes are 10½-in. thick on front and sides and 7½-in. in the rear, the 12-in. turrets being 12-in. thick on front and 8-in. sides and rear, with 2½-in. top plates. The 8-in. barbettes are 6-in. front and sides and 4-in. rear, the 8-in. turrets being 6½-in. front and 6-in. sides and rear, with 2-in. top plates. There is a 9-in. conning tower with a 6-in. armored tube and the torpedo stations have 2½-in. armor.

There is a complete protective deck, from stem to stern, flat amidships and sloped at the sides and ends. It is built of ½-in. plates throughout with 1-in. nickel steel in the flat and 100 lbs. nickel steel on the slope. Coffers filled with cellulose are worked from end to end of the vessel. The magazines are of large capacity and so arranged that about one-half of the total supply of ammunition is carried at each end of the vessel. Where their bulkheads are near heated compartments, they are arranged with air spaces.

Port half plan of boiler rooms showing main and aux. feed pump discharge pipes, safety valve escape pipes etc., ladders and gratings.



ENGINES OF THE MISSISSIPPI AND IDAHO.

DESCRIPTION OF THE PROPELLING MACHINERY.

The propelling machinery, much of the description of which has been taken from the Journal of the Society of Naval Engineers, for February 1904, is as follows: The engines will be of the vertical, twin-screw, triple-expansion type, designed to develop 10,000 I. H. P., at about 120 revolutions per minute, with steam of 250 pounds pressure at the high-pressure cylinder. The cylinders are 25½, 42 and 69 in. diameter, with a common stroke of 48 in. Each engine will be, as usual in a separate watertight compartment. They are of the usual bureau design, with open framing, the only difference for the later designs being that they have one low-pressure cylinder instead of two. Every effort has been made to keep the cylinder clearances as small as possible. The cylinders are entirely independent, and not secured to each other save by a tie rod on each side, connecting the three cylinders, and by athwartship tie rods between the two engines. There is one set of valve gear for each cylinder, and all valves are piston valves. The engines will be provided with all the necessary auxiliaries and accessories, in accordance with the latest practice of the Bureau of Steam Engineering.

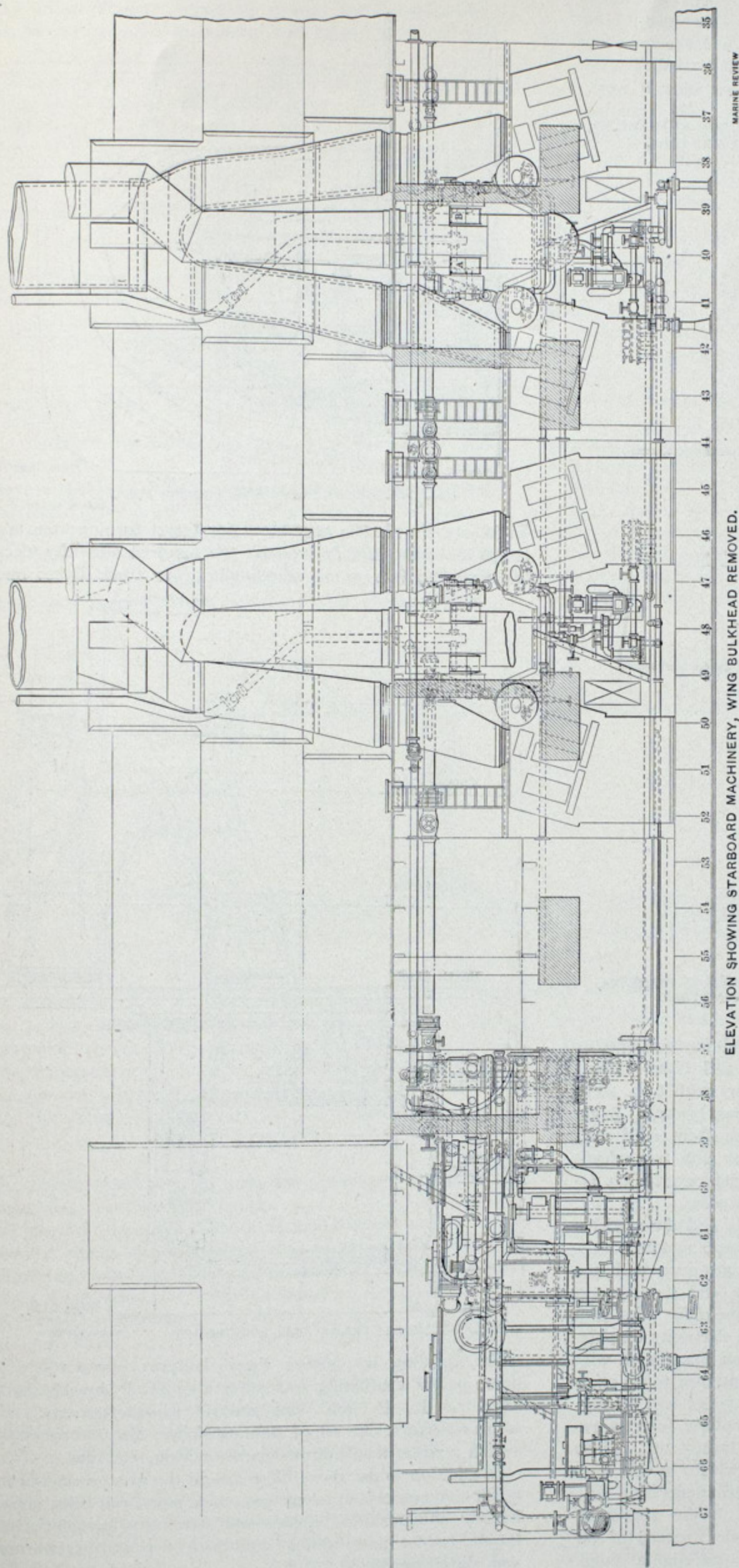
There will be eight water-tube boilers, placed in four watertight compartments. They will have not less than 768 sq. ft. of grate and not less than 32,640 sq. ft. of water-heating surface. The working pressure will be 265 lbs. The lengths of the grates will be about 7 ft. The steaming capacity will be such that all steam machinery on board can be run at full power with an average air pressure in the fire rooms of not more than 1 in. of water. All parts of the boilers subject to pressure will be of wrought steel. There will be no screw joints in contact with the fire. No malleable or cast iron or cast steel will be used under pressure. Generating tubes will be straight and not less than 2 inches in diameter. The tubes will be expanded at their ends into headers, which will be sinuous in shape, for the purpose of staggering the groups of tubes. Each header will be provided with openings, to permit the inspection, cleaning, removal and renewal of a tube through the same. There will be a baffle plate at the lower row of tubes, leaving at the back of the boiler sufficient area for the escape of gases and there will be baffle plates so placed as to make the gases pass at right angles to the tubes.

All the necessary auxiliaries and accessories will be provided for the efficient working of the boilers.

There will be two funnels, each 100 ft. high above the base line. Forty tons of fresh water will be carried on trial in the double bottom or in reserve tanks for use of the water-tube boilers.

All steam pipes, 2½ in. diameter and above, will be of steel.

There will be two main condensers, each with a cooling surface of about 6,960 sq. ft.; two auxiliary condensers, each with 380 sq. ft. cooling surface and two dynamo condensers, each with 950 sq. ft. cooling surface. The main condensers will have independent, vertical, double, double acting air pumps, also independent, double inlet, centrifugal, circulating pumps, the latter of sufficient power to discharge 10,000 gallons of water per minute, from the bilge. The auxiliary



and dynamo condensers will have combined air and circulating pumps.

There will be hot well, main feed, auxiliary feed, fire and bilge, distiller circulating, distiller fresh water evaporator feed, brine, and oil pumps.

AUXILIARY MACHINERY IN DETAIL.

In addition to those pertaining to the main engines and dependencies, there will be the following auxiliary machinery, complete with all pipings and fittings:

Steering engine; windlass engine; ashhoist engines for each fire room; forced draft blowers, air compressors, refrigerating plant and an evaporating and distilling plant.

These auxiliaries are in accordance with modern practice. One new point, however, is the requirement that the refrigerating machine, with a capacity of three tons of ice per 24 hours, be operated by an electric motor. Another is the greatly increased capacity of the distilling and evaporating plant which, in this ship, is the same as that on the 16,000 ton battleships. The evaporating plant consists of three evaporators and three distillers with their accessories, having a combined capacity of 16,500 gallons of potable water per twenty-four hours. The evaporators are arranged to be operated in single effect or, the high pressure evaporator may be operated with either of the low pressures, in double effect.

As in other ships recently designed it is optional with the contractor to use rotary engines or steam turbines for the blowers provided the steam consumption does not exceed 50 lbs. per indicated horse power per hour.

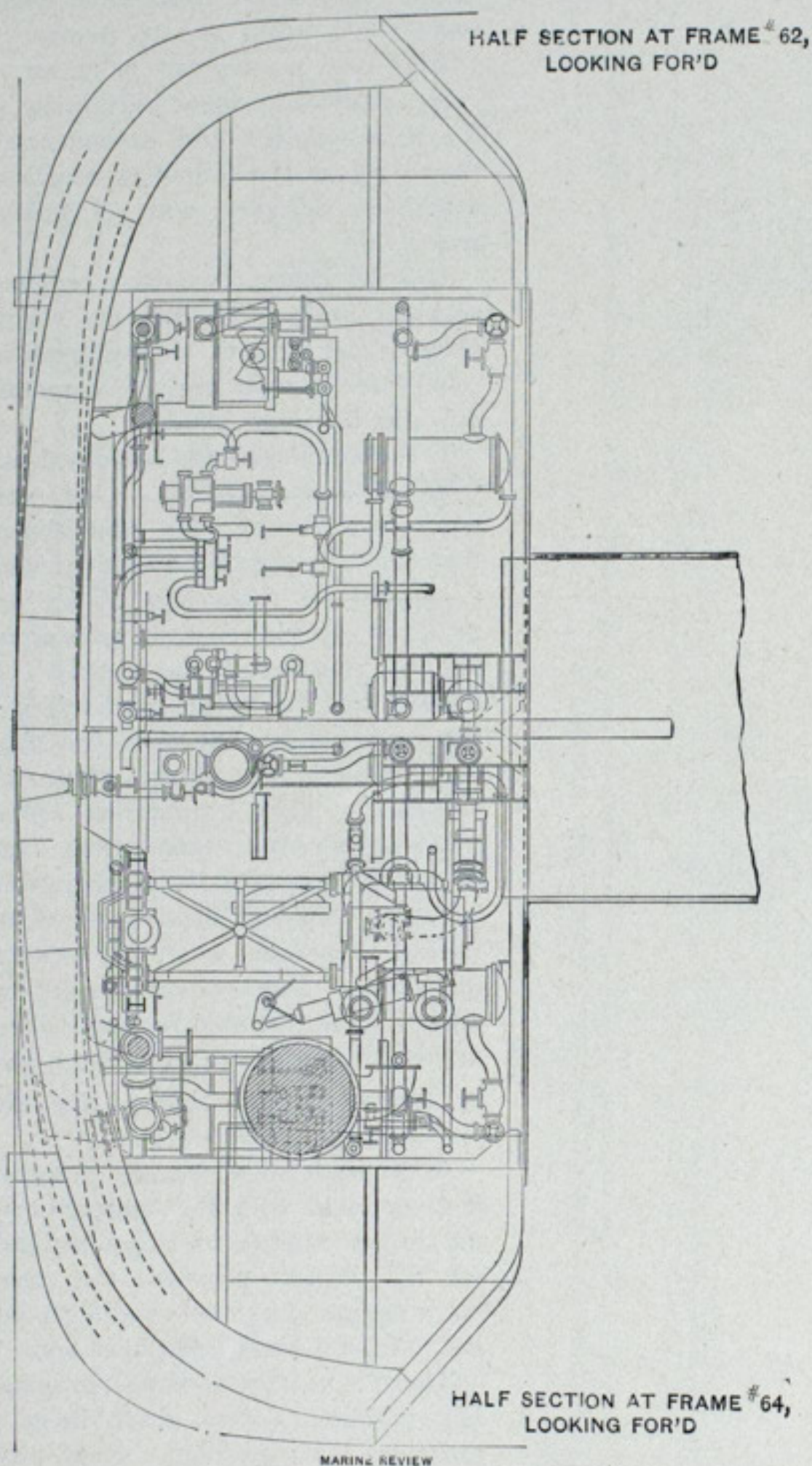
There is a very complete drainage and flooding system, there being a main drain for machinery space, auxiliary drain for all bilges, double bottom drains for all water tight compartments and flooding connections for all compartments in machinery space also for trimming tanks. There will be sounding tubes and air escapes, magazine floods and a complete fire system with about 50 hose connections.

There will be a flushing system to all parts of the ship and a fresh water system, the total quantity of fresh water carried in ships' tanks being about 14,000 gallons.

There is a complete steam heating system; an air compressor for use in running pneumatic tools and for blowing soot off the boiler tubes, also air compressors for the torpedo outfit.

There is a blacksmith shop, carpenter shop and machine shop, the latter with a very complete outfit of tools consisting of one screw-cutting back-gear extension-gap lathe, to swing 16 in. over the upper ways and

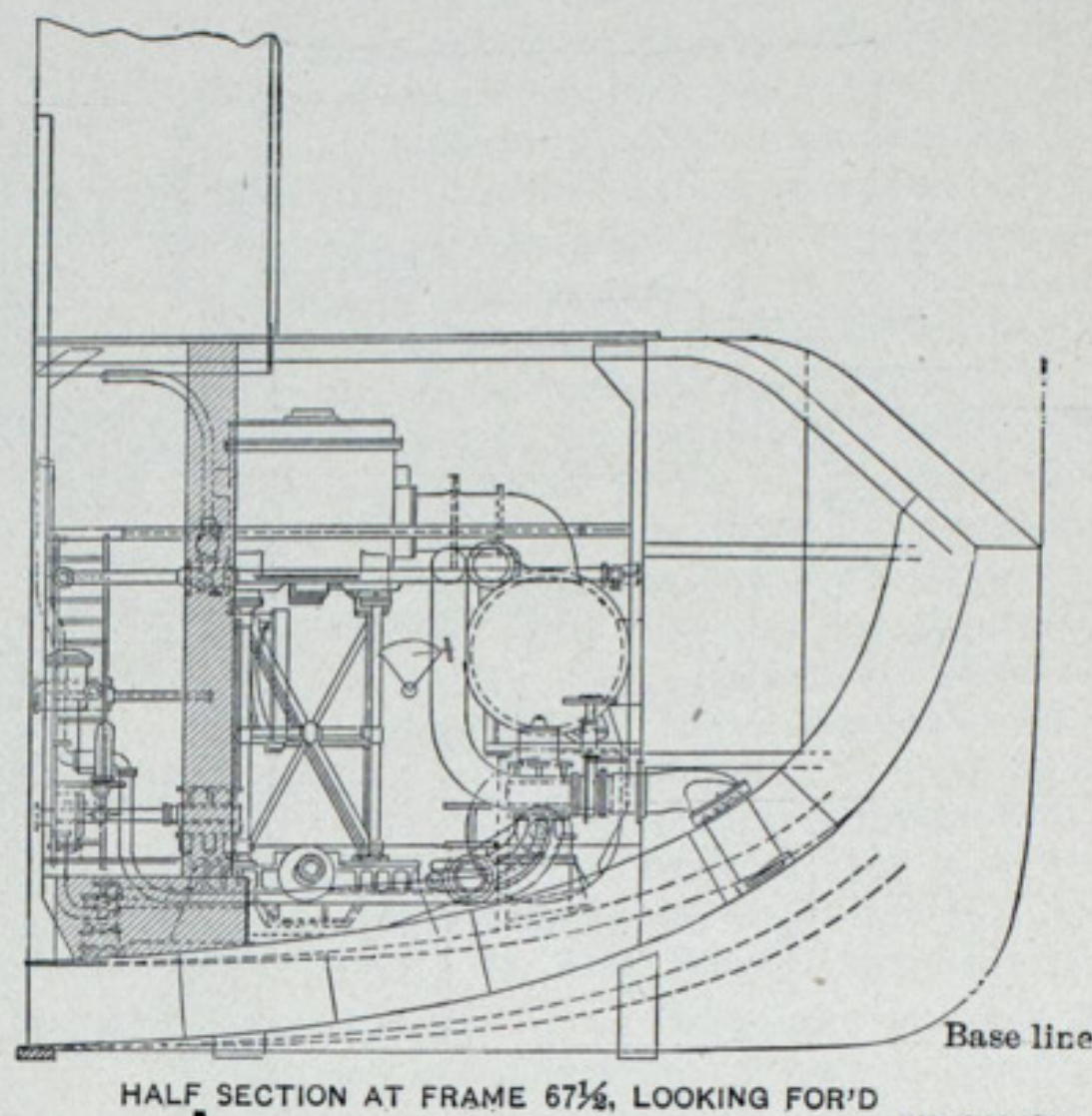
32 in. over the lower ways, and to have a bed about 11 ft. long. One 14-in. screw-cutting back-gear lathe, to have an 8-ft. bed. One pillar-shaping machine of about 16 inches stroke and about 24 inches traverse; one 28-in. back-gear vertical drill press, to drill up to 1½ inches in steel, 14 in. from edge of work;



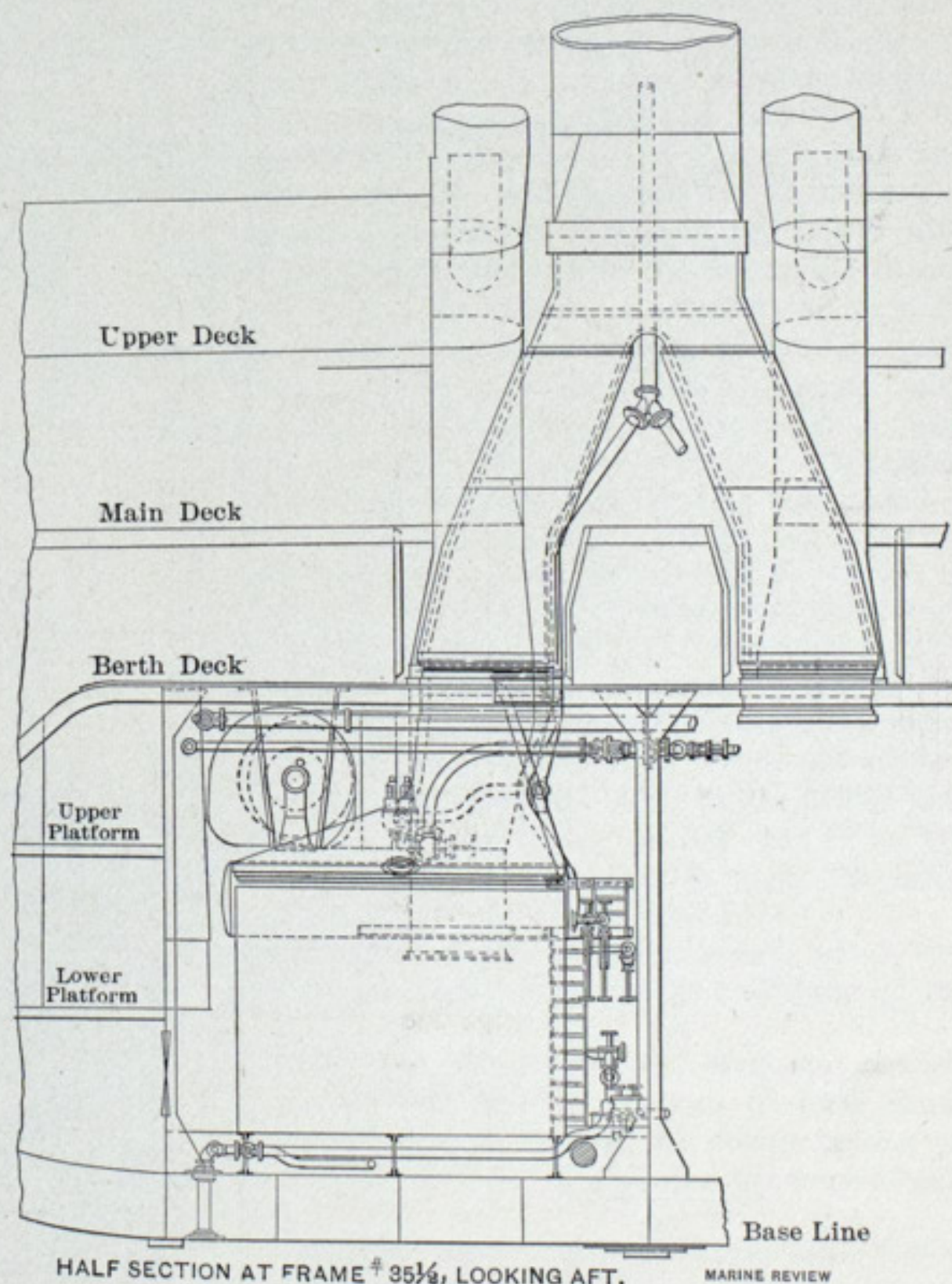
one 16-in. sensitive drill; one universal milling machine, of about 20-in. table feed, 6-in. cross feed, and 18-in. vertical feed; one combined hand punch and shears with 6-in. shear blades, capable of cutting ¾-in. round iron, shearing ¾-in. steel plates, and punching ¾-in. holes in ¾-in. mild steel plates 4 in. from edge; one emery grinder with two wheels 12 in. in diameter and 2-in. face, with surface grinding attachment; one 30-in. grindstone; six bench vises.

There will be a full equipment of tools and the machine tools will be driven by one or more electric motors.

One of the most interesting facts in connection with the vessels of the new navy, is the growth and development of the electric plant. Starting on some of the older ships with plants of small capacity, the application of electricity on ship-board has so developed that we find, as on this vessel, with the exception of the auxiliaries before mentioned to be operated by steam, all power on board of the vessel will be electric, as boat cranes, ventilating blower motors, turret turning motors, deck winches, ammunition hoists etc. These varied uses require a large electric plant which, in this case, consists of eight 100 kilowatt, steam driven generating sets, of 125 volts pressure at the terminals. These generating sets are placed in two dynamo rooms, one forward of the boiler rooms and one between the boiler and engine rooms.



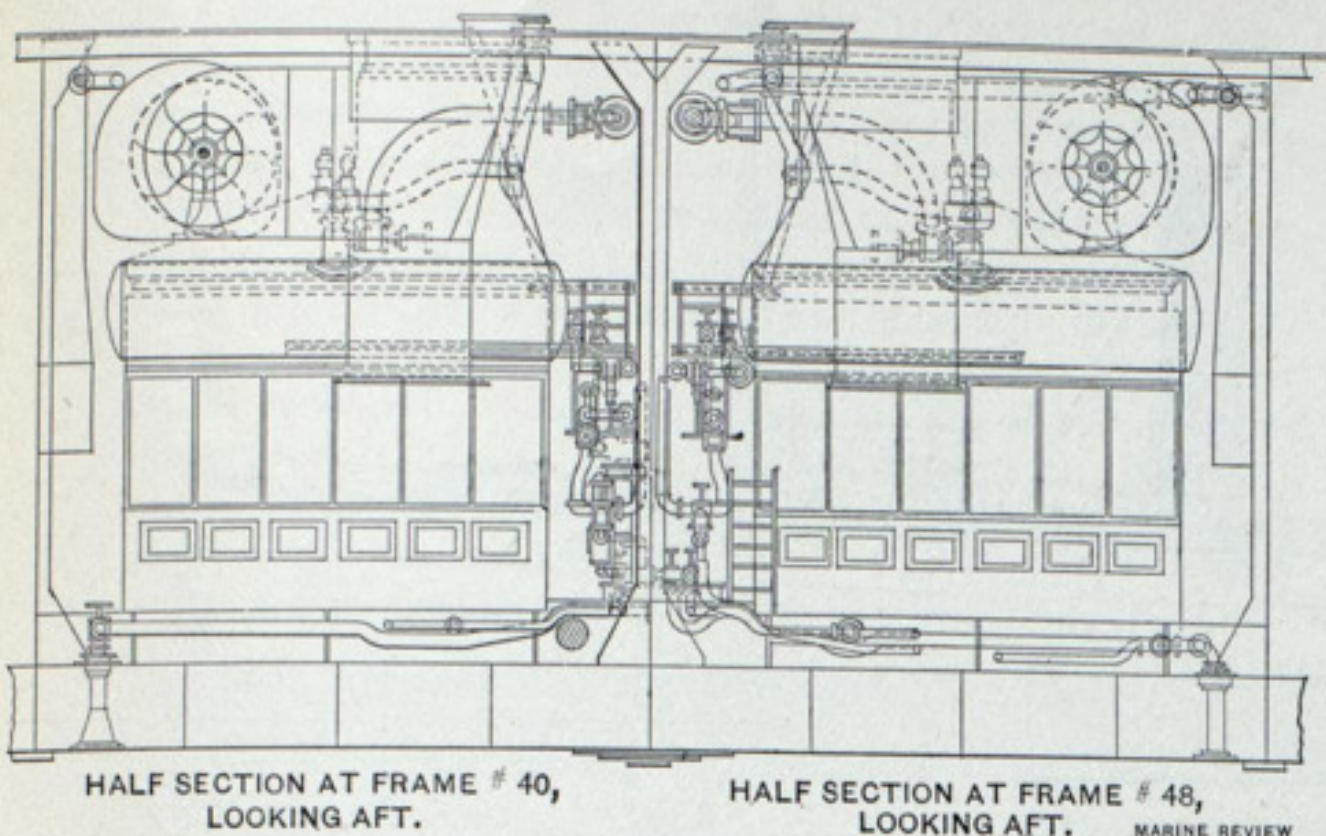
There are six electric generators for turret turning; ten arc lamps in engine and fire rooms; ten hundred and fifty electric fixtures; five 30 in. searchlights; one truck light; one



night signaling set; eleven signal lanterns, six portable ¼ horse power ventilating sets; fifty 1-12 H. P. bracket fans; eight 1-6 H. P. fans; one electric whistle operator; six cargo reflectors, one set of running lights; also the necessary switch boards, distribution boards, wiring, etc., etc.

In addition to the above there are all the usual means of interior communication, telephones, voice pipes, call bells, gongs, buzzers, annunciators, engine and steering telegraphs, revolution, rudder and heeling indicators, fire alarms, warning and alarm signals, etc.

The ventilating system will consist of twenty-three electrically driven blowers, supplying at least 114,300 cubic feet of air per minute. These blowers will supply air to all the



main compartments below the gun deck except the coal bunkers.

The coal bunkers, with a maximum capacity of 1,750 tons, are arranged with reference to giving a rapid and abundant supply of coal to the fire rooms.

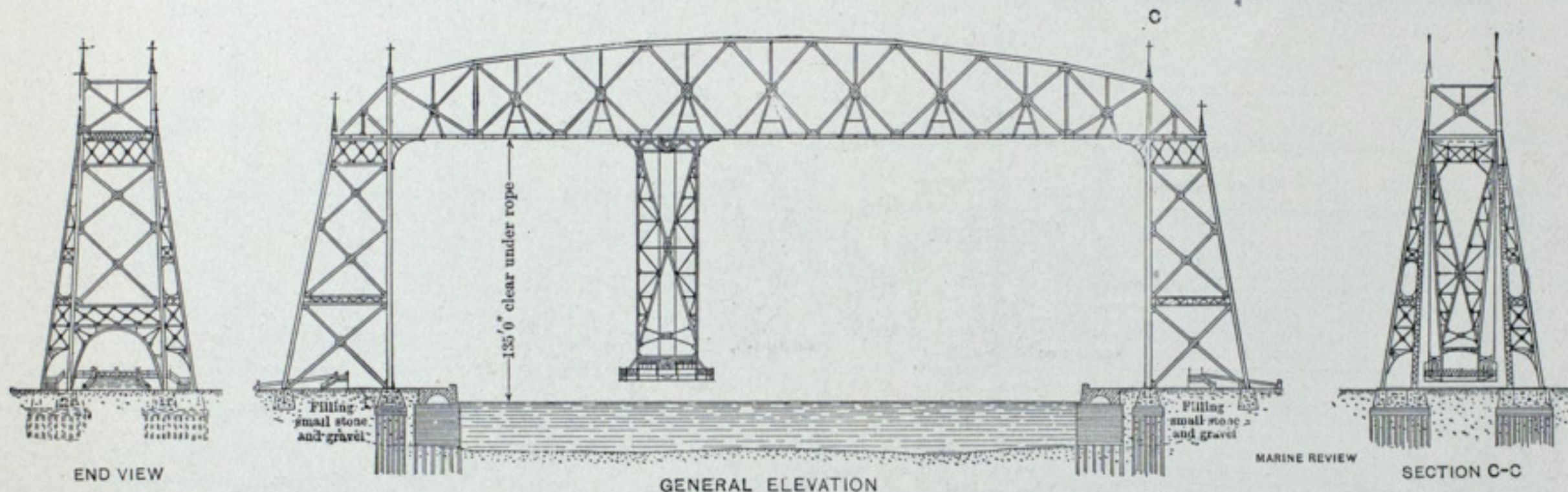
Each ship has the following boats, provision being made for their convenient stowage and handling. Two 40-foot steam cutters; two 33-foot sailing launches; four 30-foot cutters;

it can be seen from the foregoing description that they are very powerful, complete and efficient vessels and will prove most useful when commissioned and in active service.

DULUTH CANAL BRIDGE.

The Modern Steel Structural Co., Waukesha, Wis., has just been awarded a contract for a \$100,000 suspended car transfer bridge at Duluth, Minn. This bridge will be as high from the water as the Brooklyn bridge, allowing all vessels to pass underneath. It is 400 ft. long between the towers and it will be erected cantilever fashion from each shore or sea wall of the present canal at Duluth, this method of erection not interfering with navigation. On the lower chords of the span are two tracks carrying sixteen trucks, from which hangs a suspended car 135 ft. below, all arranged to stand the hard Duluth winds. The car is provided with two 50 H. P. electric motors connected to large winding drums, which, through the aid of steel cables wound about them, are arranged to pull the car across the canal in each direction every three minutes. The capacity of the car is sufficient to carry 200 people in the cabins and the open space on car will carry one large street car and two or three loaded wagons and teams.

This structure is to be the first of its kind ever built in the United States. A similar structure, being the only one in existence, is in operation at Rouen, France. It is made of cables of light capacity and carries about fifty persons. The heavy carrying trade out of Duluth harbor has made this kind of structure necessary, as the suspended car can dodge be-



SUSPENDED CAR FERRY BRIDGE OVER SHIP CANAL, AT DULUTH.

three 30-foot whaleboats; one 30-foot gig whaleboat; two 28-foot cutters; two 20-foot dinghies; four life rafts.

The arrangement of quarters provides accommodation for a complement of 719 officers and men.

The following is a summary of the weights to be carried:

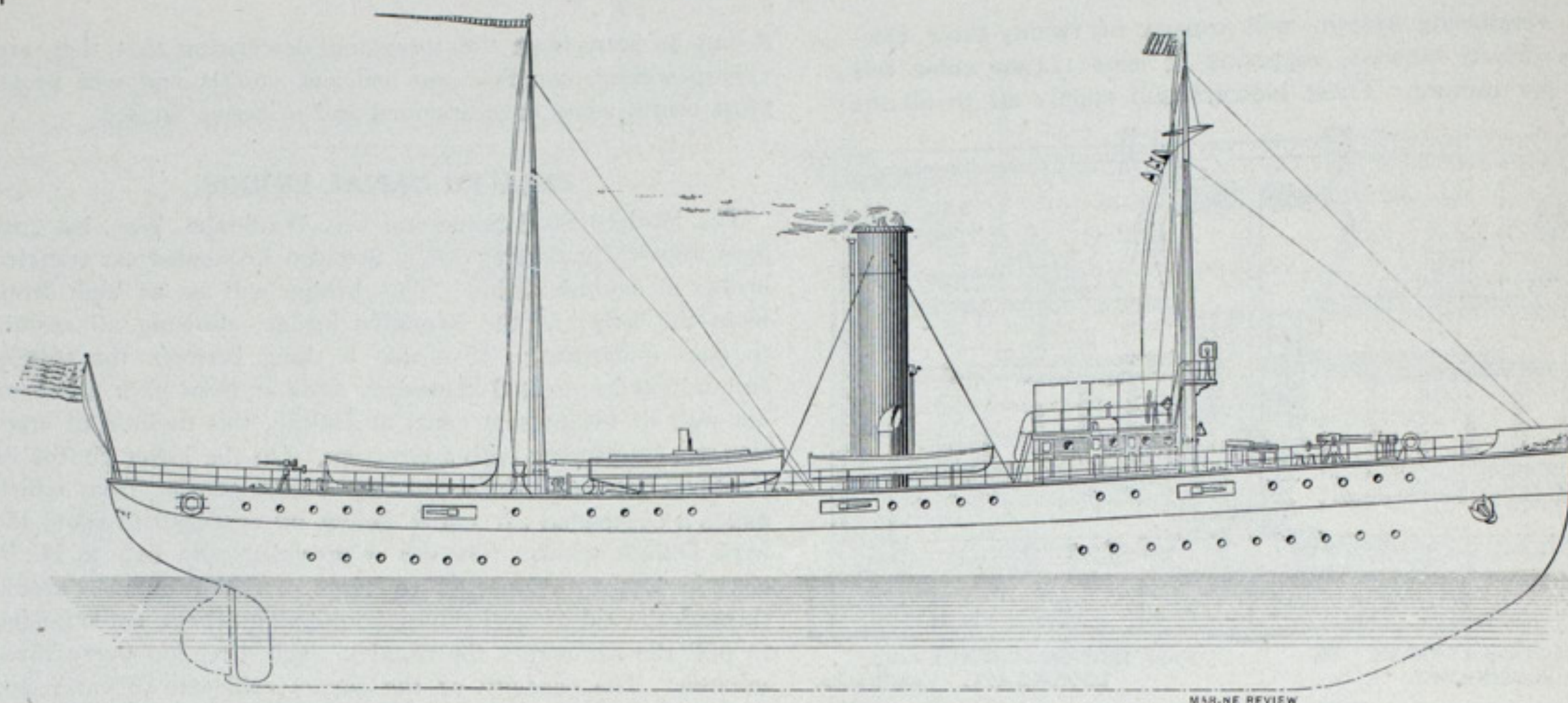
	Tons.
Guns, torpedo tubes, mounts, magazine equipments, etc.	849.3
Ammunition, two-thirds full supply	342.2
Steam engineering complete, with water in boilers, condensers, piping, etc., and stores, etc., not to exceed..	1,010
Engineering stores supplied by Government.....	40
Reserve fresh water for steaming purposes.....	40
Coal, normal supply	600
Boats and outfits	32.6
Masts and spars	14.6
Equipment complete, including anchors, chains, electric plant, etc., and two-thirds equipment stores	324.4
Miscellaneous stores and water, two-thirds full supply.	77.2
Provisions, clothing, and small stores, two-thirds full supply	124.8
Officers, crew, and effects	92.6
Total protection, including armor, armor backing, armor bolts, cellulose, and splinter bulkheads	3,323

While these battleships are the smallest designed since 1898,

tween vessels, while with a bascule or swing bridge land traffic would have to be temporarily blocked. The bridge will be begun May 1 and completed Nov. 1.

The Quebec Steamship Co. of New York is having built in England a new steamer for its Bermuda service. This vessel will be 425 ft. long, 50 ft. beam and 38 ft. deep to the top of shelter deck. She will be fitted with 120 first-class staterooms on the main and promenade decks with a saloon to seat 220 passengers. The steamer will be equipped with two sets of triple-expansion engines with cylinders 25, 44 and 72 in. diameters by 48 in. stroke. She will have three double-ended boilers and three single-ended boilers, 15 ft. in diameter, with twenty-seven furnaces, allowed a pressure of 200 lbs. Her guaranteed speed is 16 knots, but as the ship is of a very fine model, it is anticipated that her power will be sufficient to give her a speed of 17 knots in fine weather. She is to be delivered next November.

Gen. E. C. O'Brien of New York is to be made secretary of the Panama Canal Commission. He was chairman of the International Deep Waterways convention in Cleveland in 1896, and was the United States commissioner of navigation from 1889 to 1893.

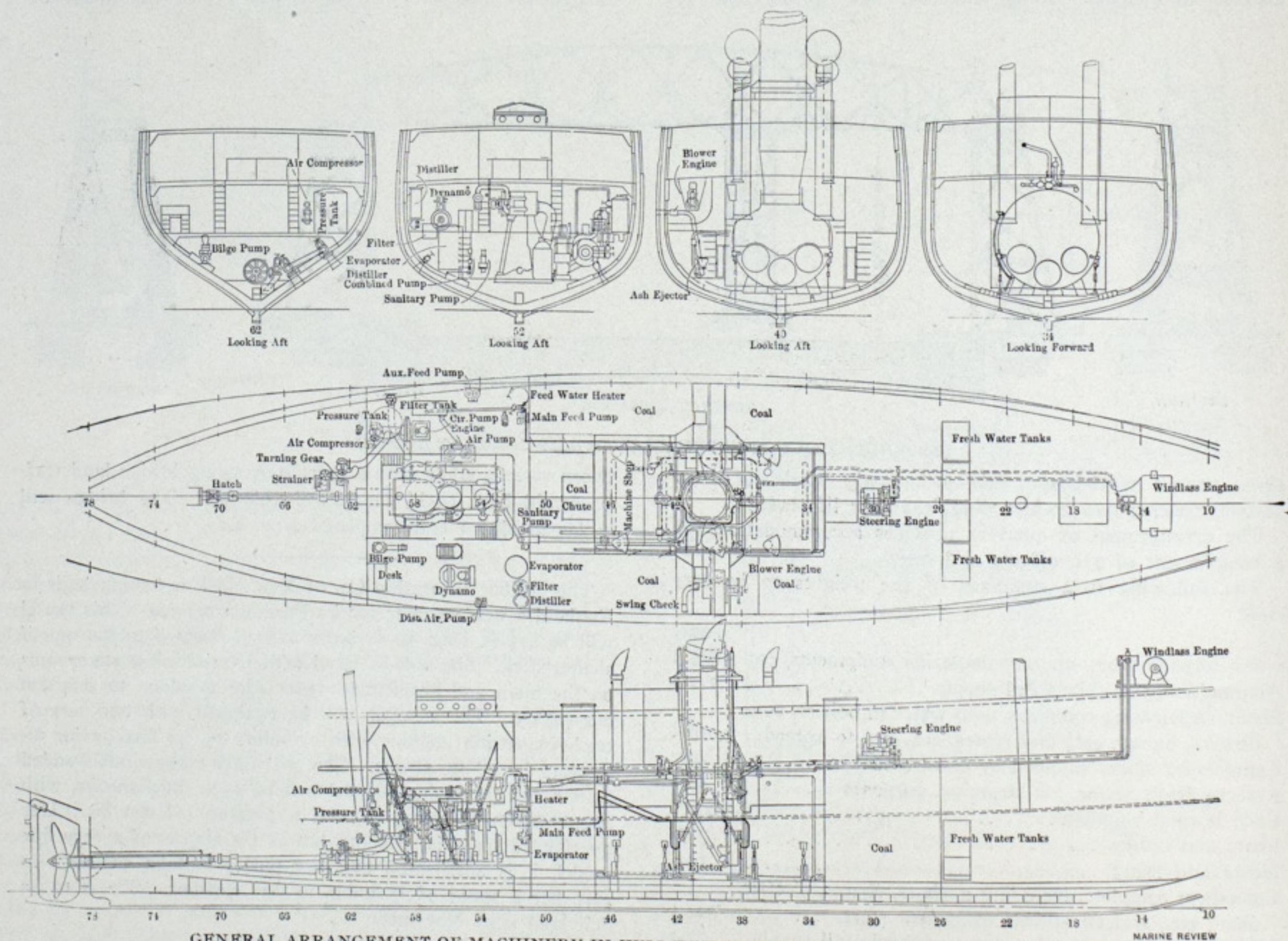


OUTBOARD VIEW OF REVENUE CUTTER FOR THE MAINE COAST

NEW REVENUE CUTTER FOR THE MAINE COAST.

At the last session of the fifty-seventh congress, through the efforts of Senator Frye of Maine, an appropriation of \$200,000 was made for the construction of a revenue cutter of the first-class for duty on the coast of Maine. The design of this vessel has now been practically completed and in a short time

it has been decided to construct the vessel of wood. The bow, instead of being ram shaped, as has been customary on other cutters, is cut away under water to facilitate getting through the ice by crushing it down rather than cutting through it. The stern is on the order of those used for the double-end gunboats during the civil war. Although wood is used for



GENERAL ARRANGEMENT OF MACHINERY IN HULL OF REVENUE CUTTER FOR THE MAINE COAST.

proposals will be asked from ship builders for her construction. In design of the hull the new vessel will present a radical departure from other cutters of her class, owing to the peculiar duties assigned to vessels on this station. In the long winter season frequent calls for assistance come from ice-bound sailing vessels, and to perform this duty efficiently

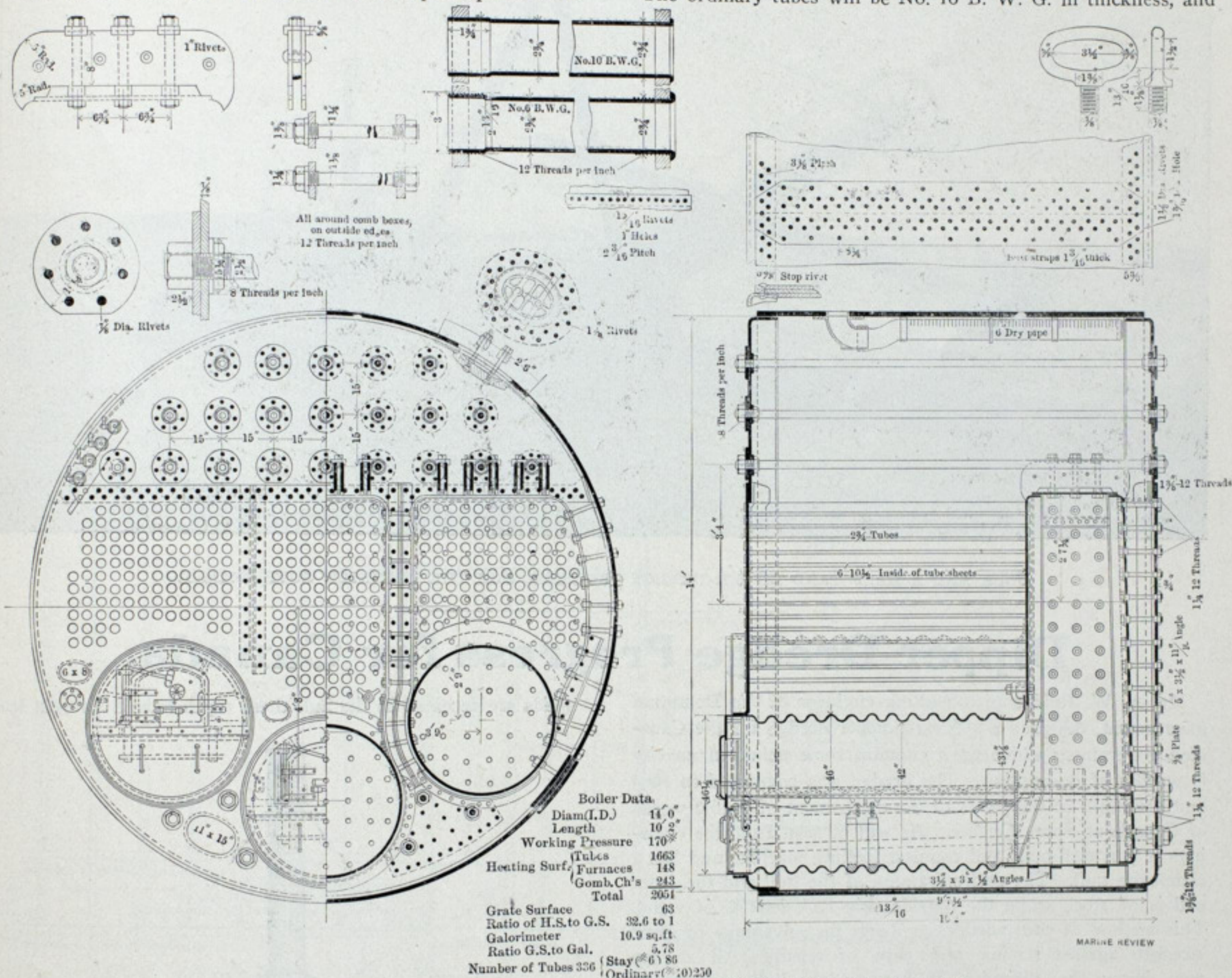
the greater portion of the vessel, metal has been worked in wherever it will add to the lightness and strength of the vessel without detracting from the object for which the wooden construction was adopted. As a consequence, all deck beams will be of steel, as will also the hanging knees, deck stringer plates, hatch coamings, etc. The stern post, rudder post and rudder are to be of manganese bronze. The vessel will have

three decks extending the whole length, the spar deck being flush fore and aft. The rig will consist simply of two pole masts upon which stay-sails can be set for steadying the ship in a beam wind. The living quarters will be very commodious, provision being made for a crew of seventy men and eight officers. The new cutter, in addition to being fitted for carrying a light battery, is also fitted for carrying six 4-in. breech-loading rifles. For assistance to merchant vessels in time of peace, large towing bitts and a towing machine are to be provided, as will also complete apparatus for destroying derelicts. The following will be the principal dimensions of the new craft: Length over all, 210 ft.; length between perpendiculars, 188 ft.; beam moulded, 35 ft. 2 in.; beam extreme, 36 ft.; depth moulded, 26 ft. 3 in.; displacement to 12 ft. 6 in. W. L., 1,190 tons.

The steam machinery will consist of a triple-expansion en-

of which will work off the couplings connecting the two sections of crank shaft. All auxiliary machinery will be independent of the main engine and will consist of a vertical twin air pump, centrifugal circulating pump and engine, duplex main and auxiliary feed pumps, both located in the engine room, duplex fire pump, general service pump and a bilge pump.

Steam will be furnished by two Scotch boilers, each 14 ft. in diameter by 10-ft. 2-in. long. The shell is made in two sheets, and will be 1 3/16-in. thick. The total heating surface will be 4,108 sq. ft., and the total grate surface 126 sq. ft., or a ratio of 32.6 to 1; the calorimeter, or ratio of area through tubes to the grate surface, will be 1 to 5.78. There will be 336 seamless drawn steel tubes, 2 3/4-in. outside diameter, in each boiler, of which eighty-six will be fitted as stay tubes. The ordinary tubes will be No. 10 B. W. G. in thickness, and



DETAILED DESIGN OF BOILER OF REVENUE CUTTER FOR THE MAINE COAST.

gine of the usual vertical, direct-acting, inverted type having steam cylinders 20 $\frac{3}{4}$ -in., 32-in. and 50-in. in diameter, respectively, by 27-in. stroke. The condenser is built and forms a part of the framing of the engine. A noticeable feature of the design is there versing engine which acts vertically and is bolted to the flanges connecting the intermediate and low-pressure cylinders. This allows the reversing shaft to be placed at the back of the engine and leaves the front of the engine entirely clear, to get at the working parts. The piston rods, connecting rods, valve stems, reversing shaft, crank-shaft and line shafting will be of the best quality of mild open-hearth steel. The high-pressure valve will be of the piston type, and the intermediate and low-pressure valves will be of the double-posted slide type, all to be actuated by the Stephenson double-bar link gear, the intermediate eccentrics

the stay tubes No. 6 B. W. G. There will be three Fox's corrugated furnaces in each boiler, of a diameter of 42-in. inside and a thickness of 9-16-in. They will be of the latest pattern, and so fitted as to be easily removable if necessary to fit new furnaces at any time. The boilers are designed for a working pressure of 170 lbs. per square inch.

In addition to the apparatus already described, there will be a steam windlass; a steam steering engine; a steam winch on after deck; an electric generator of 10 K. W. capacity, which, in addition to lighting the ship throughout, will be capable of operating a 24-in. searchlight located on a platform just forward of the fore mast; an evaporating apparatus, having a capacity of 4,000 gallons of potable water in twenty-four hours; a complete system whereby all bilges may be pumped either by steam or by hand. Fresh water will be supplied to

wash basins and bath tubs in all parts of the ship from a 500-gallon tank located in the engine room. An air compressor working in connection with this tank keeps, by means of an automatic valve, a constant pressure of 10 lbs., which forces the water throughout the ship. The forced draft system will be of the closed fireroom type, the air being furnished by means of a large centrifugal blower located in the upper part of fireroom. The main engine at full power is expected to

develop about 1,800 I. H. P. which will drive the ship at a speed of from 14½ to 15½ knots per hour.

The hull of this vessel was designed by First Lieut. J. C. Moore, R. C. S., the superintendent of construction; the steam machinery and all auxiliaries, such as the sanitary system, steam heating system, pumping and drainage system, etc., are designed by Capt. John W. Collins, the engineer-in-chief of the revenue cutter service.

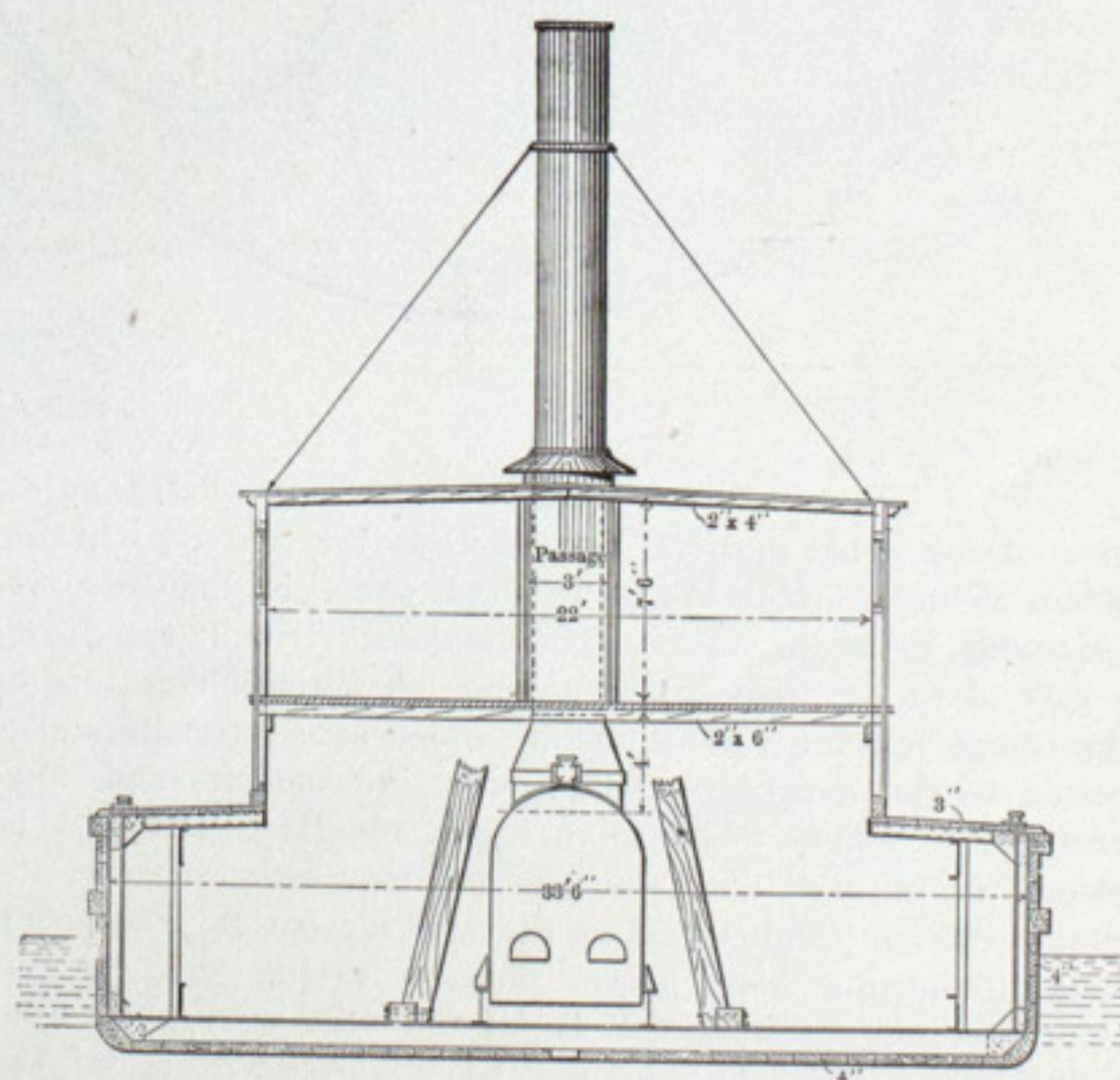


FOUR AND A HALF YARD DIPPER DREDGE PROGRESS, FOR THE DOMINION GOVERNMENT.

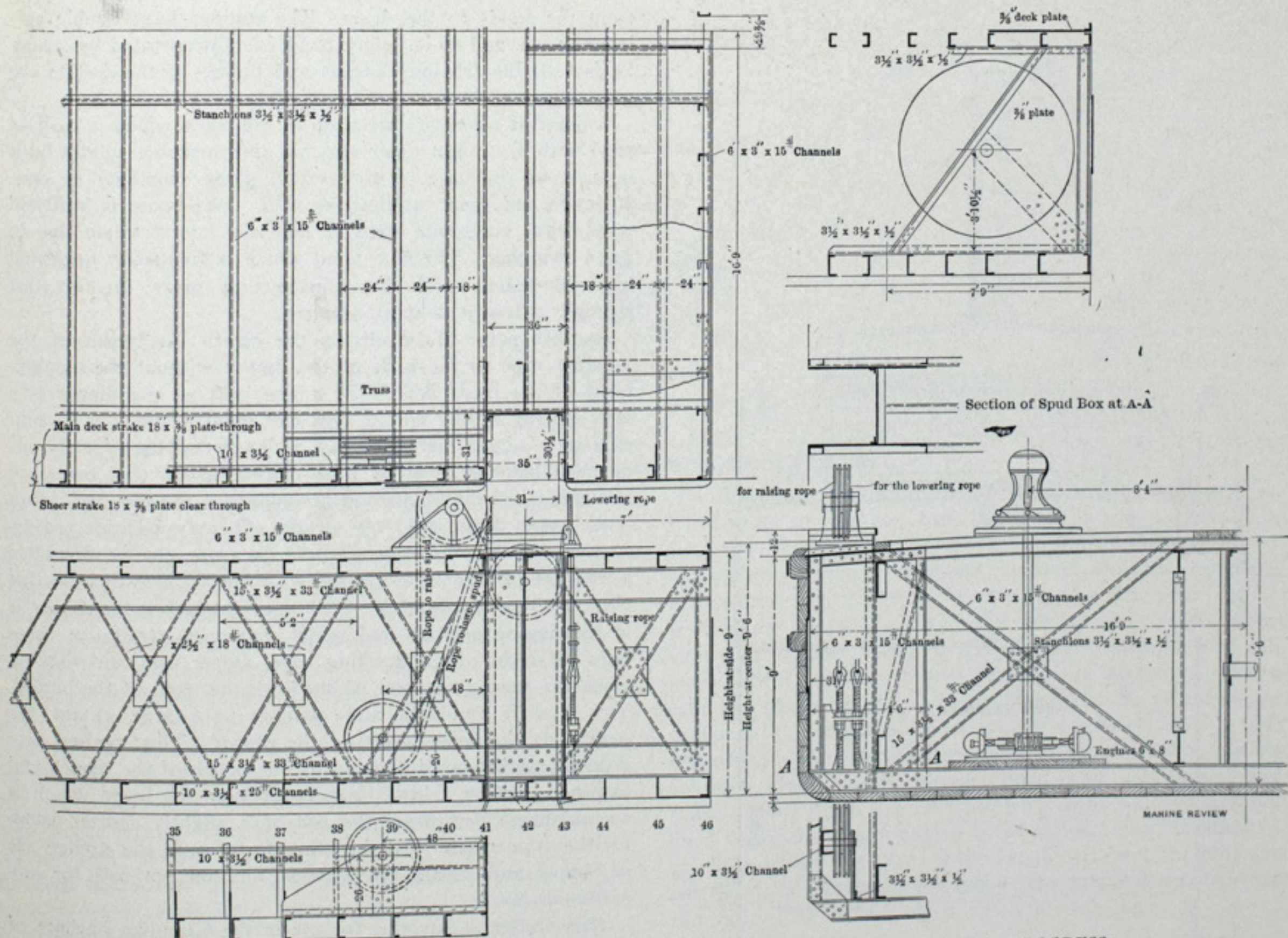
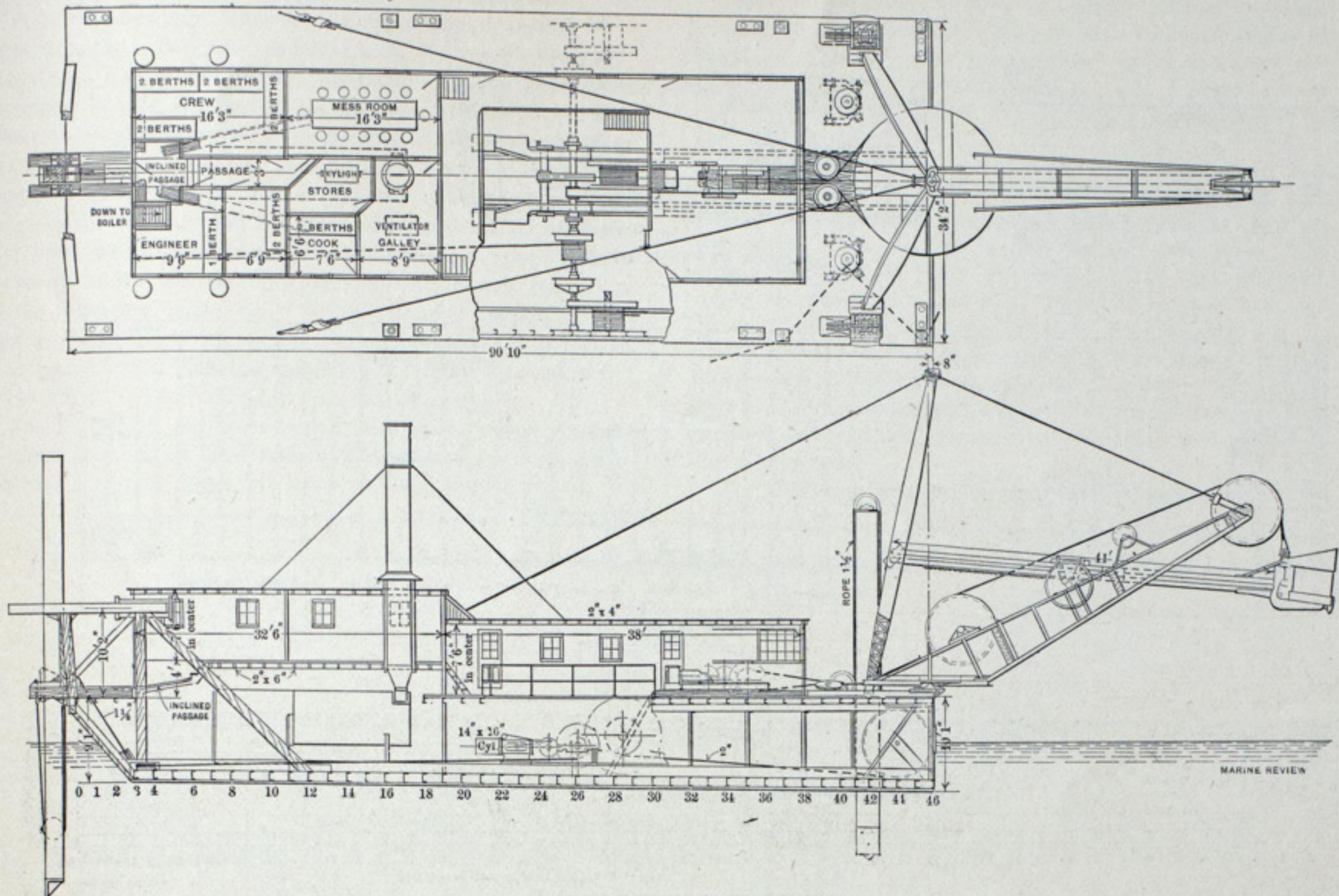
Dipper Dredge Progress for Canada.

Mr. A. W. Robinson, consulting engineer of the Dominion government, designed a 4½ yard dipper dredge for the Canadian government which, as it contains some points of novelty is worthy of description. The dredge was completed in 1903 and was built at the yards of the department of public works of Canada at Sorel, Quebec. As will be seen from the drawings it is a well-built and compact looking machine and has a composite hull. The entire framing of the hull and the front end is of steel, while the outside skin and deck is of wood. This method of construction combines the advantage of great strength against strains and ease of repairs. All dredge men know the difficulty of keeping the hull of a dipper dredge strong and tight with wood construction around the front end and around the spud slides. By means of this steel frame construction all that part is perfectly solid and stiff. The spuds are recessed in the hull and there are heavy steel plates extending under the planking both on the deck and on the bottom entirely around the spud slides so as to take the heavy horizontal strains which there occur. The front end of the dredge also being of steel plate is very strong and rigidly connected with the spud slides. There are two internal trusses of steel which, however, do not extend above the main deck and ample strength is obtained by this construction. The A-Frame is of steel and stepped upon the deck in such a way that it is directly supported by the spuds. The spuds are hoisted and pushed down by steel wire ropes worked from the main engines. Owing to the fact that the

spuds are recessed in the hull these ropes have a straight lead



SECTION AT FRAME NO. 7



ELEVATION, CROSS SECTION AND GENERAL VIEW OF 4 1/2-YARD DIPPER DREDGER PROGRESS.

DESIGN FOR TWIN-SCREW TOW BOATS.

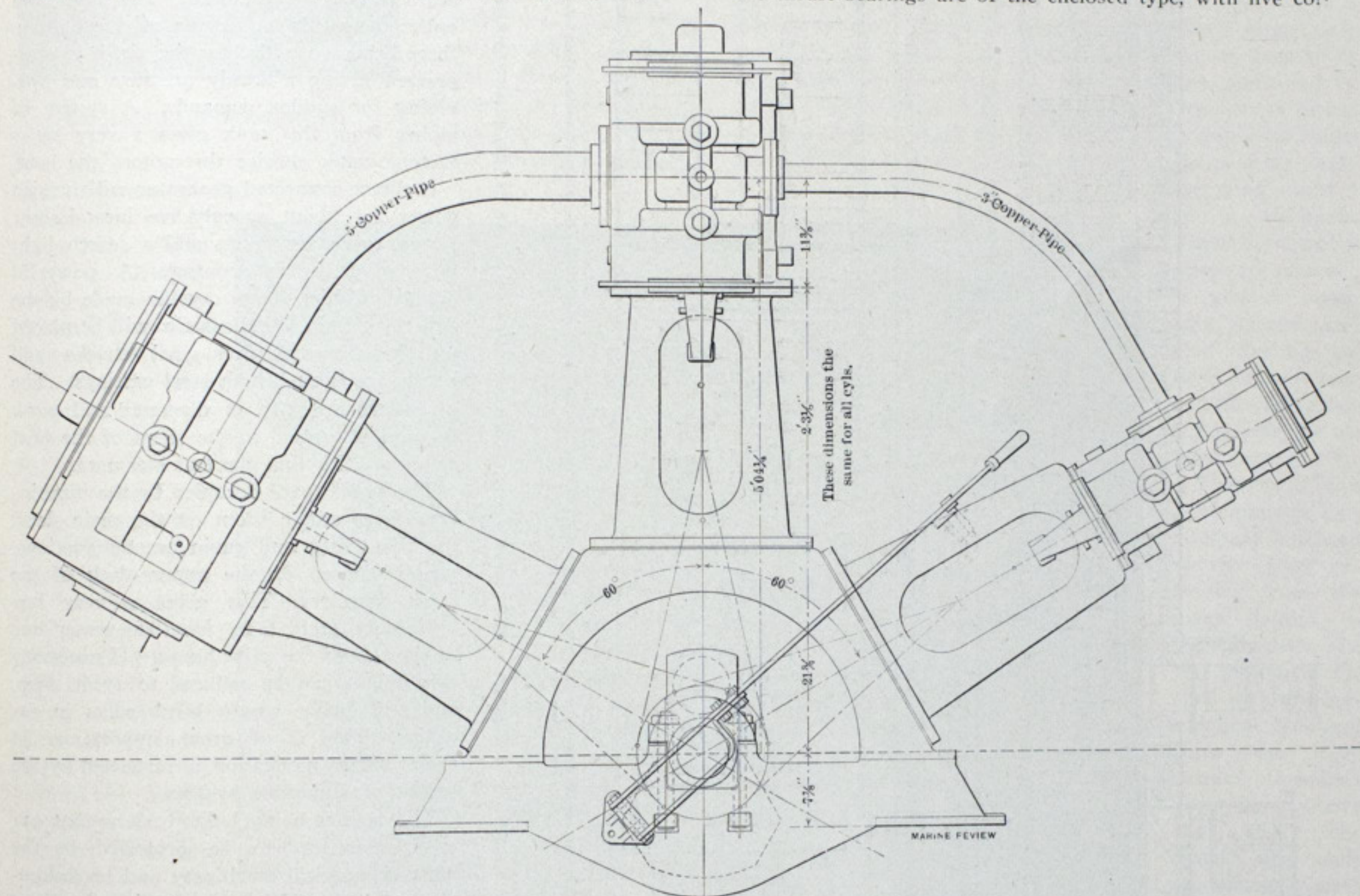
A brief description and the accompanying drawings of a light draught twin-screw steel tow boat, for use on the western rivers, now in course of construction at The Ward Engineering Works, Charleston, W. Va., will be of interest. The general design follows very closely that of the James Rumsey designed and built by the same firm last year for the United States Engineer Corps. In a pushing and backing contest between the Rumsey and the stern-wheel towboat D. T. Lane last year, which was completely described in the MARINE REVIEW, the Rumsey was an easy victor. The new steamer is of the following dimensions: Length between perpendiculars, 150 ft.; length over all, 151 ft.; beam moulded, 26 ft.; beam over guards, 28 ft.; depth moulded, 5 ft.; sheer forward, 2 ft.; sheer aft, 1 ft. 6 in.; draught with coal aboard, 3 ft.

The hull is of best open hearth steel plate, built on a substantial framing of steel angles, Z bars and channels. The plating is 7-32-in. thick, all lap seams are single riveted, the

There are four coal bunkers as shown on the drawings, with a total capacity of 80 tons: giving a steaming radius of about 2,000 miles at 10 miles an hour. Spiral conveyors will deliver the coal at the bunker doors. The bunkers will be made water tight, so that by closing the bunker doors oil fuel may be used.

The cabin or deck house is built throughout of the best white pine, arranged as shown, with officers' quarters, two state rooms, bath room and water closet forward. Just aft the engine room are six berths for the deck crew. The crew's quarters are very commodious and well arranged. There are five state rooms with two berths in each, bath and lavatory, dining room 12-ft. by 19-ft. 3-in., kitchen 9-ft. by 11-ft., pantry 9-ft. by 8-ft. 6-in.; also a work shop or general store room 10-ft. 6-in. by 19-ft. The pilot house 12-ft. square just over the forward fire room, is fitted with a steering wheel 9-ft. in diameter and the necessary bell pulls and signals to the engine room.

The thrust bearings are of the enclosed type, with five col-



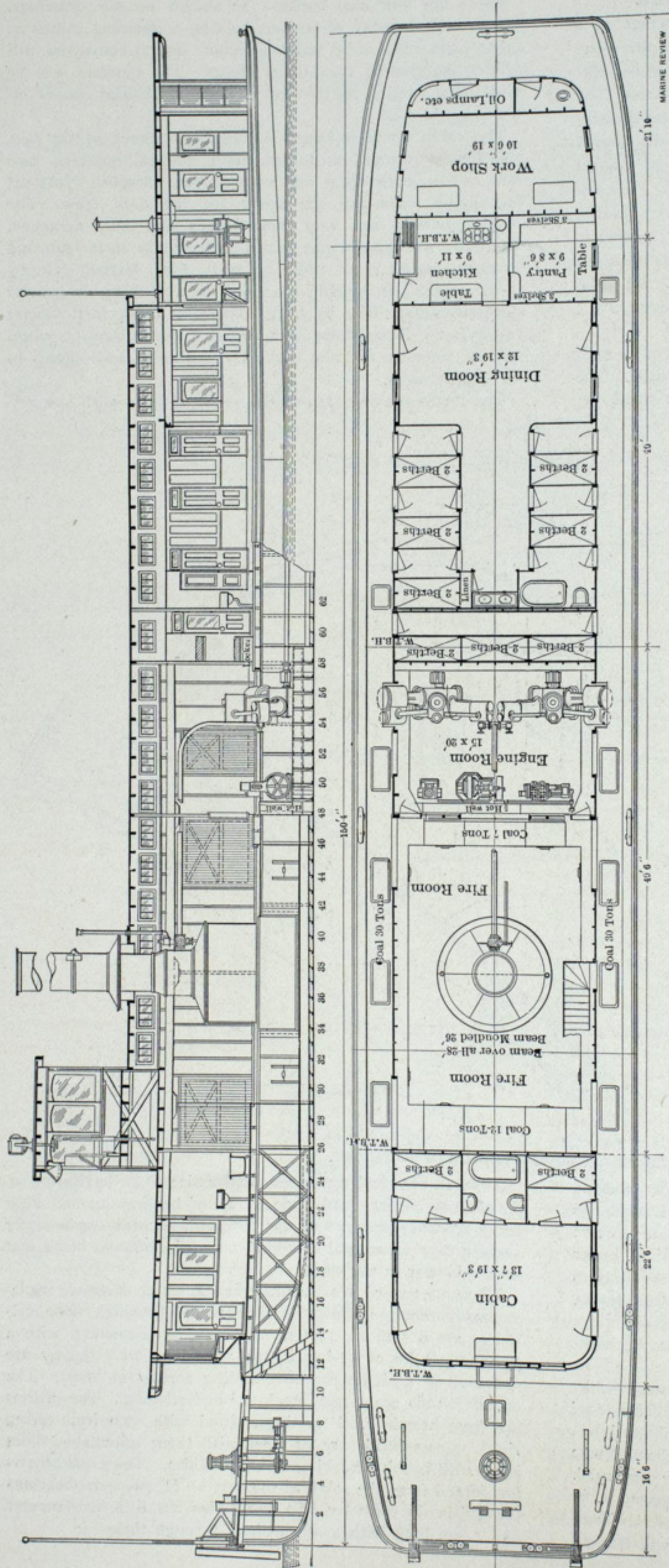
DESIGN OF LIGHT-DRAUGHT TWIN-SCREW TOW-BOAT.

butts are triple chain riveted. The frames in the modeled part of the boat are 2-in. by 2 1/2-in. by 1/4-in. steel angles, in the flat 3-in. Z bars are used, all spaced on 18-in. centers: stringer angle 2 1/2-in. by 2 1/2-in. by 1/4-in. A shelf or under plank sheer 1/4-in. thick at the center, reduced at the ends to 5-32-in., extends around the boat underneath the deck beams, to which it is riveted. On the outer edge of the shelf is a 3-in. by 4 1/2-in. by 1/4-in. guard angle, which forms the backing for a 4-in. by 8-in. oak nosing.

The hull is divided into five watertight compartments, by four athwart ship bulkheads. Two longitudinal bulkheads of 1/4-in. plate extending from bulkhead No. 2 to bulkhead No. 4 and lattice trusses from bulkhead No. 1 to bulkhead No. 2 hold the hull straight. No hog chains or braces are used. The deck beams are 4-in. x 5 1/4-in. channels, spaced 2 ft. center to center, each beam securely riveted to the shelf and the stringer angles on the longitudinal bulkheads and trusses.

A Ward sectional water tube boiler size P-30, having 77 sq. ft. of grate surface and 2,490 sq. ft. of heating surface, built for a working pressure of 275 lbs., will furnish steam under regular duty at natural draught: unusual demands being met with a blower in the stack.

There are two of Ward's single crank, single eccentric triple-expansion engines shown in the general drawing. The cylinders are 8 5-16-in., 1 1/2-in. and 25 5/8-in. diameters, with a common stroke of 14-in. Piston valves on all cylinders are operated by a single eccentric sliding across the shaft. The eccentric rods are forged steel, finished all over. The pistons are open hearth steel castings, fitted with cast iron spring rings. Cross heads are of steel with taper adjustable shoes lined with babbitt, working in bored slides. The crank shafts are forged from the solid, of the best O. H. steel, the bearings are 5 1/2-in. in diameter, the crank pins are 6-in. in diameter and 14-in. long with a 2 1/2-in. hole through them.



LONGITUDINAL AND DECK PLANS OF LIGHT-DRAFT, TWIN-SCREW RIVER TOW BOAT, BUILDING AT THE WARD ENGINEERING WORKS, CHARLESTON, W. VA.

lars on each running in white metal bearings, a stuffing box at each end of the thrust provides an oil tight bearing; thus insuring perfect lubrication for this most important bearing. The main bearings and the crank pin bearings are of Phosphor bronze lined with Parsons white bronze, and are of ample surface to provide for continuous running.

There are two condensers, of the Ward sectional outboard type, one on each side of the boat: the condensation is delivered to the hot well by a Blake simplex air pump. The main feed is a Blake outside packed, duplex plunger pump, controlled by a float in the hot well. Water for washing and sanitary purposes is furnished by a small Marsh steam pump, discharging into a cylindrical tank in the hull. The inlet and outlet from this tank come off the bottom, there being no outlet for the air, it is compressed giving a steady pressure and providing for sudden demands. A system of piping from this tank gives a very satisfactory water service throughout the boat.

A direct connected generator will furnish power for about seventy-five incandescent lamps, three arc lamps and a search light with pilot house control. A powerful double cylinder steam capstan made by the American Ship Windlass Co. will be placed on the forward deck. All chocks and kevels are open hearth steel castings. The propellers are 5-ft. in diameter and work in tunnels formed in the stern of the boat as usual with this class of steamers.

The small space occupied by the machinery leaves ample room on the main deck, for the living and cabin accommodations, usually placed on the upper deck of the stern wheelers. This gives a very low boat, only 24 ft. 6 in. from the water line to the top of the pilot house. If necessary this height can be reduced to 17 ft. 6 in. and still leave ample head room in the cabins. This is of great importance in rivers where navigation is restricted by the height of numerous bridges.

The boat is being built to show that our river steamers can be propelled by the most economical machinery and to demonstrate the feasibility of handling the large tows of coal, on the western rivers, with a twin screw towboat using triple-expansion engines. The present stern wheel towboats are remarkable for their handling power, but are most extravagant in the use of fuel. In most cases using high-pressure engines exhausting into the atmosphere at from 100 to 150 lbs. terminal pressure. Some of the more modern stern wheelers have compound condensing engines, but their economy compared with a high speed triple expansion engine is very small. In this case the saving in coal for 365 days would be nearly \$3,500.

It has been said that the average river engineer could not run the high speed engines on the new type of boats. This, however, does them a great injustice, as the record of the Rumsey's engineer shows,

LAUNCH OF GREAT NORTHERN LINER DAKOTA.



DAKOTA'S LAUNCHING PARTY.

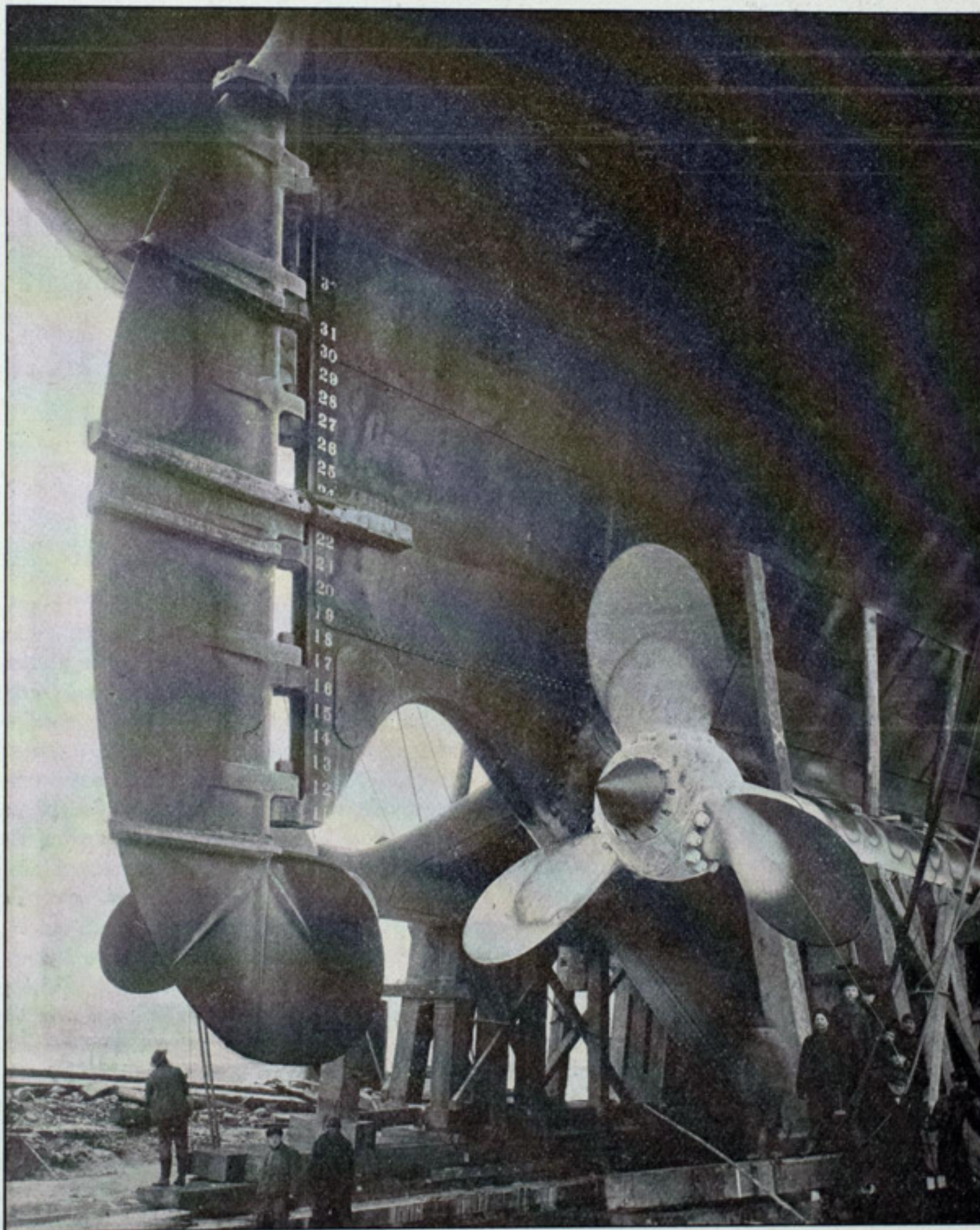
One of the most courageous of men is Mr. James J. Hill, president of the Great Northern railway, who has steadily pushed to completion the two great liners building at the yard of the Eastern Ship Building Co. for the foreign trade of the United States. The Dakota, the second sister, was launched at the yard Feb. 6 and a gala event was made of the occasion. A special train carried guests to New London from New York; the University of Da-

kota selected the person who was to name her — Miss Mary B. Flemington. Miss Flemington is a very beautiful and vigorous girl, and when it came to smashing the proverbial bottle of wine, which so many young women fail to smash at all, she smashed it so thoroughly as to drench the bystanders with its effervescent contents. The Dakota is intended for service between the Pacific terminus of the Great Northern railway and the orient. She is the largest vessel ever constructed in the United States. She is 630 ft. long; 73 ft. 6 in. wide; 56 ft. high to upper deck; 88 ft. high to captain's bridge and 177 ft. high to top of mast. She has five continuous decks which cover a space of several acres in extent, named orlop, lower, 'tween, main and upper. In addition she has four decks

which are not continuous, being the forecastle, promenade, bridge and boat decks, making nine decks in all. She is rigged as a four-masted schooner with pole masts. The chief characteristic of the Dakota is her great strength. She is designed primarily for comfort and carrying capacity with a fair speed at low power. Her framing is built on what is called the longitudinal system. The great center girder, which is usually in the form of an I girder, is in the Dakota in the form of a II or box. In other words, she has two vertical keels instead of one. The girder is of the same depth as the double bottom, 6 ft. On each side of the girder there are several other vertical longitudinal members, having the plating on top, forming the tank top, and the shell plating below, forming the bottom of the tank. This tank or double bottom is 6 ft. deep for the greater part of its length, and is increased at the extreme ends where it merges into the fore-and-aft peaks at the collision bulkheads. The whole of this space can be filled with water when desired, to sink the ship to a suitable draught when making a voyage without a cargo; or a very light one at the same time allows the ship to keep afloat when ever the outer shell or "skin" has been punctured by rocks or by colliding with other vessels. This bottom girder or double bottom forms the "backbone" of the ship from which the great frames spring or extend up to the weather deck,

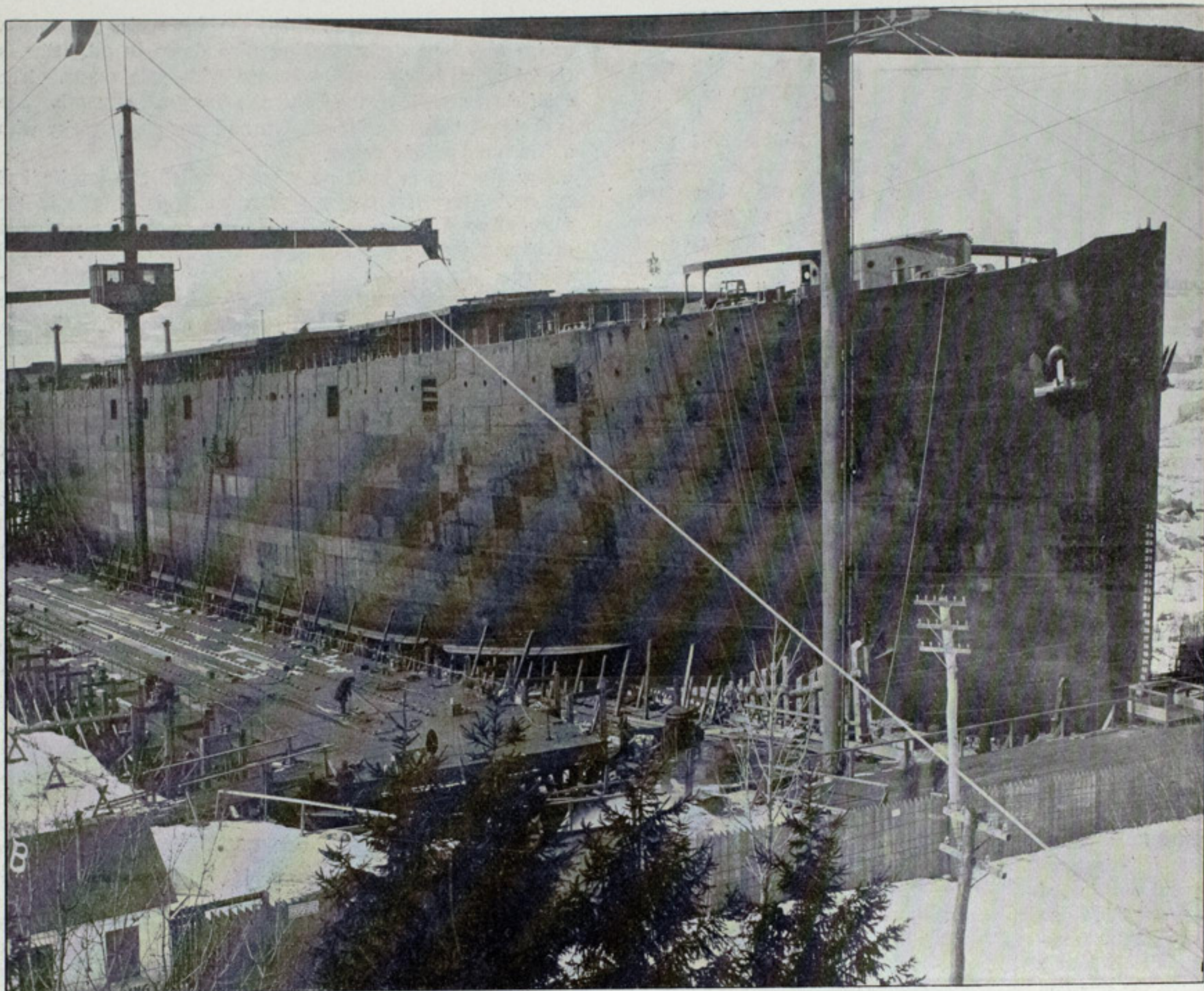
averaging about 1 in. in thickness. These enormous plates are arranged to give a maximum strength, and the riveting of them to the frames and to each other is receiving the utmost care.

These ships have a continuous longitudinal bulkhead on the center extending from the inner bottom to the main deck. The side plating of the shell with this longitudinal bulkhead form the three vertical members about 60 ft. above the keel. The frames are made of channel steel, spaced 30 in. apart, but as they near the extreme ends they are spaced closer and are composed of angle bars riveted together. At certain parts of the structure, where the heave of the sea will tend to strain the ship, the frames are double and made very strong. The outer surface of these frames is covered with a shell of steel plates



VIEW OF PROPELLER AND RUDDER OF THE DAKOTA.

has four decks



GREAT NORTHERN LINER DAKOTA READY FOR THE LAUNCHING.

[Building by the Eastern Ship Building Co., New London, Conn.]

of the entire structure. The upper flanges of the girder are formed by the upper and main decks, which are laid with heavy steel plates. This great girder is designed to support a full cargo when suspended by long waves of the sea at either end. The side girders are kept in place by three intermediate decks between the tank and main deck, making in all five complete decks, each covered with heavy steel plate. The beams supporting all these decks are of channel steel, and fitted to every frame by large bracket plates. One of the many notable features in the construction of these vessels is the distribution of the water ballast. Various conditions of trim and safety can be obtained. The double bottom is divided longitudinally into three watertight divisions and transversely into about twelve, making in all 36 separate tanks. In addition to these there are the fore-and-after peak tanks and side tanks between the main and 'tween decks, about one-quarter of the vessel's length from either end. The latter tanks are really fitted for the purpose of controlling the ship's stability and sea-worthiness.

The vessels are divided transversely into thirteen watertight compartments, while the longitudinal bulkhead is watertight in the machinery space, which makes in all fifteen watertight compartments. The engine rooms are completely independent of each other; so are the boiler rooms, but access is had from one to the other by watertight doors. The coal bunkers are situated above the boilers and are so arranged that coal can gravitate direct to the stokehole floor. The method of pillaring is somewhat novel and has never been

attempted before by any American ship builder. The Dakota has a deadweight carrying capacity of 20,000 tons. She has twin-screws and her engines are expected to develop 10,000 H. P.

The navy department proposes to make an early investigation of the cost of producing armor plates and the process employed in European countries, and orders have been given to Rear Admiral Charles O'Neil, chief of ordnance, to proceed abroad to make such investigation. Admiral O'Neil retires on March 15 by statutory requirement. In view of the discussion that usually attends the preparation of naval appropriation bills in congress regarding the question of armor plates, Secretary Moody determined to collect as much information as possible on the subject. The high rank of Admiral O'Neil and the fact that he is regarded as being eminently fitted for this duty, caused the secretary to designate him as his representative abroad. The points to be handled will be left to Admiral O'Neil's discretion.

Adolph Green of Green Bay is pushing wrecking operations on the sunken steamer S. C. Baldwin, and the vessel is being gradually raised, resting on chains, which form a regular cradle for her. No attempt has been made to pump her out, as she is full of hard wood lumber which, being soaked with water, would hold the steamer down even if the water were out. As soon as the ice is out of the channel an attempt will be made to take her to Sturgeon bay for repairs.

United States Life-Saving Service.



TYPE OF OLD-TIME STATION.

When it comes to a question of real service performed, no department of the government can be compared to the life-saving service of the United States. Whatever service this department performs is a real service, because it is never extended until there is need for it. It is a service done always at great hazard, always involving the lives of rescuer and rescued. 'Tis a grim business, this of the life saving service, and yet how cheerfully it is always done. By some strange irony of fate, this department has never got its just deserts. The federal government, paternal in some ways and prodigal in others, has dealt with a chary hand towards the life-saving service. The crews are hired at the opening of navigation and

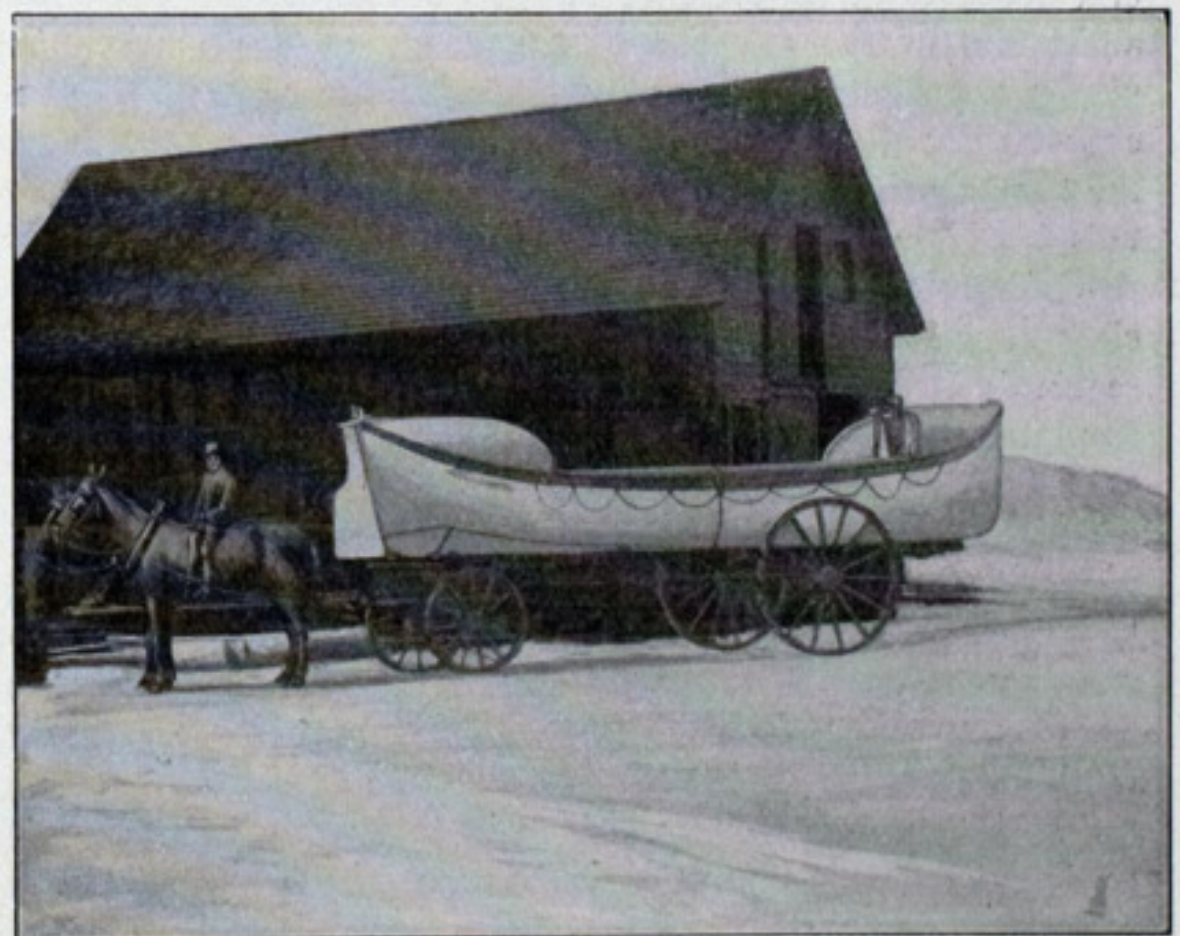


TYPE OF MODERN STATION, SALISBURY BEACH, MASS.

ger to shipping and vary somewhat in their character, according to their environment and the nature of the service demands of them. Some of them are merely huts that have been appropriated to the service of surfmen, while others are built especially to house the crews and are modern in every respect. On some portions of these coasts the stations are placed only at long intervals, while on others they form chains of continuous posts within communicating distance of each other. In the majority of stations built for the service the first floor is divided into four rooms, a boat room, mess room, keeper's room and store room. Wide double leaf doors and a sloping platform extending from the doors to the ground permit the running out of the river equipments from the building. The second story contains two rooms, one a sleeping room and the other for rescued persons. Every station is surmounted by a lookout or conservatory in which a day watch is kept. The roofs of the stations are usually painted a dark red, as this color is distinguishable for a long distance. They are also marked by a flag staff 60 ft. high, used in signaling passing vessels by the international code. Stations are generally equipped with two surf boats and boat cargo, two sets of breeches-buoy apparatus, a cart for land transportation, a life car, a Lyle gun and the usual rockets for signaling.

The United States has a coast line, exclusive of Alaska, of more than 10,000 miles. Distributed along this line are 272 life-saving stations, of which 195 are situated on the Atlantic and Gulf coasts, sixty on the great lakes, sixteen on the Pacific coast and one at the falls of the Ohio river at Louisville. These stations are located at chosen points of dan-

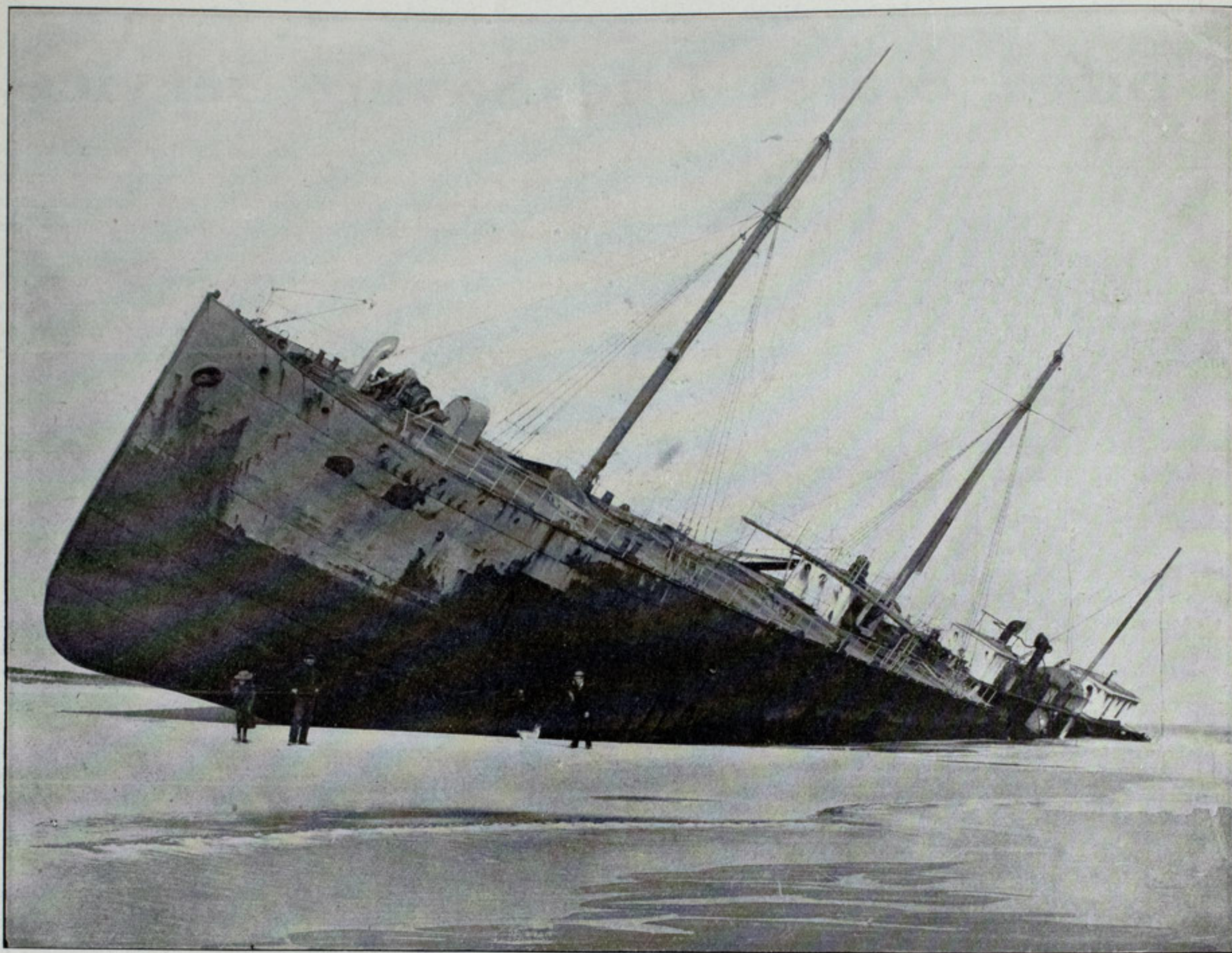
The United States life-saving service is the only exclusive governmental establishment of the kind in the world, the life-saving institutions abroad being voluntary societies supported privately. It is strange indeed that Britain, being a seafaring country and having more of its assets on the water than any other nation, should possess no government life-saving service at all. The reason is probably to be found in the brevity of its coast line. The United States has a wonderful coast line, in variety and in extent quite beyond the ability of any privately secured funds to adequately patrol. It is more extended than that of any other country and is fraught with peculiar difficulties and perils to navigators.



LIFE BOAT MOUNTED ON CARRIAGE.

Yet for many, many years the United States government was absolutely deaf to appeals for protection to vessels and life at sea. It was not until 1878 that the life-saving service was formally established by an act of congress. Hitherto the work had all been done out of private purses.

The first regular attempt at organized succor was made by the Massachusetts Humane Society, an organization of gentlemen originally formed in 1786, incorporated for gen-



VICTIM OF AN ATLANTIC HURRICANE.

eral purposes of benevolence in 1791, but directed toward the alleviation of the miseries of shipwreck in 1789, when it placed some huts on desolate portions of the coast of Massachusetts for the shelter of mariners who might escape from the sea, the first built for this purpose being erected at Lovell's island near Boston. This was the humble beginning of the life-saving service of the United States. In 1807 this society established the first life boat station at Cohasset. Subsequently it erected a number of others, but its efforts were necessarily limited by its dependence upon private contributions. However, under stress of great circumstance, it was occasionally enabled to evoke pecuniary aid from the general government. The first appropriation for this purpose made by congress was in 1847 and the amount appropriated was \$5,000. Later various appropriations were made by congress and were expended by this society. In 1872 the government established a life-saving service at Cape Cod and relieved the society of its onerous charge in this regard, enabling it to devote its main efforts to other parts of the Massachusetts coast.

For nearly half a century the efforts of the government for protection of navigators upon American coasts were listless and occasional. In 1807 an attempt was made to organize a national coast survey, which failed. The charts and sailing directions used for the guidance of mariners were for a long period of foreign origin and were untrustworthy. These were superseded by charts and a coast pilot of great value made by the Messrs. Blunt from surveys of leading harbors and the more frequented and perilous parts of the Atlantic coast, undertaken at their own expense. In 1820 there were fifty-five

light houses, all poorly built, all badly located, and furnished with oil lamps of inferior illuminating purposes. In 1832 the important step was taken of establishing the coast survey which at once began its magnificently comprehensive labor, and the publication of complete and accurate charts. About the same time the engineer corps of the army began a similar survey of the great lakes. The gathering movement in aid of commerce was extended to the lighthouse system, which by 1837 had 208 fixed and floating lights in operation. At the latter date congress passed an act authorizing suitable public vessels to cruise upon the coast to assist shipping in distress, and the revenue cutters were designated for this duty, an action which resulted in as much benefit as could have been expected from the limited number of vessels comprising the fleet. No other measures in aid of the mariner were taken until 1848, a date which marks the inception of the life-saving service. In August of that year Representative Wm. A. Newell of New Jersey secured an appropriation of \$10,000 for providing surf boats and other appliances for rescuing life and property from shipwreck on the coast of New Jersey. With this money eight buildings were erected at different points and furnished accordingly. An important feature of these appointments was the life-car, the invention of which is in dispute between Mr. Joseph Francis, then a boat builder of the Novelty Iron Works of New York, and Capt. Douglas Ottinger, an officer of the revenue marine, under whose supervision the establishment of this station was effected. In March, 1848, congress made a further appropriation of \$20,000 for life saving purposes. With this money some eight buildings were erected and furnished on the coast of Long

Island. The remainder of the money was devoted to establishing six additional stations on the coast of New Jersey.

It is understood, of course, that these stations were manned only by extemporized crews. The service was probably a voluntary service. In the neighborhood of some of the stations a sufficient number of men with surfing experience to form a boat crew had a sort of understanding that they would be on hand when their services were needed. In other localities the dependence was upon such crews as could be improvised from the scattered population of the coast. In 1850 congress made a further appropriation of \$20,000 for life-saving purposes. Half of this sum was spent along Long Island and the balance went to the Carolinas and Florida. The growing interest of navigation had by this time made necessary the organization of the lighthouse board, which in its turn had a reciprocal influence upon the life-saving service and caused congress to be somewhat more generous in its appropriations.

Organization, however, was lacking. There was no central control; there was no organized head for the service; and all these measures, therefore, without a cohesive body to administer them, became indeterminate and groping in character. The life boats provided and the stations established were doubtless of occasional and even signal benefit, but the lack of spontaneous custodians rendered them in a great degree nugatory. The boats in many cases were appropriated to private uses or fell into delapidation. In some instances natural changes in the beaches wrought by winds and tides made the stations out of situation for use and the ravages of time and weather had told on them all while their equipments became diminished by pillage or worthless by decay. Heart-rending scenes of disaster occurred where, either through the paucity of the stations or the time-eaten character of the appliances at hand, succor was impossible. By 1854 the inefficiency of these means, emphasized by frequent calamity, had become glaring. Public sentiment now excited congress to action. A bill for the increase and repair of the stations and the guardianship of the life boats passed by the senate in 1853 had failed to reach the house before its adjournment. A frightful disaster on the New Jersey coast, the wreck of the Powhatan, involving a loss of 300 lives, brought it up at the session of 1854, when it became a law. Under its provisions a superintendent at a salary of \$1,500 per annum was appointed for each of the two coasts; a keeper was assigned each station at the salary of \$200; the stations and their equipments were made serviceable, and bonded custodians were secured for the life boats. Partial improvement in the service resulted, but the absence of drills and disciplined crews, of any kind of government of those concerned, and above all of energetic central administration of its affairs were radical defects, and the record continued to be one of meager benefits checkered by the saddest failures. In congress in 1869 an amendment was moved to the appropriation bill providing for the employment of crews of surfmen at the stations, but though urged with great force, it was defeated. Through the vigorous efforts, however, of Senator S. S. Cox, a substitute was adopted which secured the employment of the crews, though only at alternate stations. This was a measure of great benefit, chiefly because it opened the door to the subsequent employment of crews at all the stations.

During the winter of 1870-71 several terrible disasters, some of them occurring near the stations, others at points where stations should have been, and all referable to irresponsible employees, inadequate boats and apparatus, or remoteness of life-saving appliances, thoroughly aroused the country and caused congress to appropriate \$200,000 to employ surfmen at all the stations and to put the service in order. This work was entrusted to Mr. Sumner I. Kimball, then in charge of the revenue marine service, and how well he did his work is borne out by the fact that he is still the head of

the life-saving service of the United States, though it was not until 1878 that it was organized into a separate and definite establishment independent of the revenue marine.

PROGRESS OF WORK AT DETROIT.

This winter has been a heavy one for the ship building yards at Detroit as far as repair work is concerned. At the present time there is enough ahead to keep the plants going three or four months without booking another order. The largest job will be that of rebuilding the steamer Iroquois, of the Richardson fleet. The contract has been let to John Oades and work will be started early next week. The Iroquois will be made a double-decker and the new work will extend from the plank sheer up. The job will last until the first of July. At the same plant the United States steamer Hancock has been rebuilt, receiving new planks and frames; the United States mail boat Florence B. has been replanked and ironed and Mr. Oades has a contract to overhaul the United States lighthouse tender Haze, of the tenth district, as well as all the lightships in this district. As soon as the mail boat is completed the steamer Mary will be hauled out on the marine railway for an overhauling. The yacht Minx is on the stocks for rebuild and new boiler, and the yacht Dawn will receive a new mahogany dining room, the cockpit will be abandoned and the deck aft will be greatly enlarged, aside from getting a new boiler.

At the plant of the Detroit Ship Building Co. the rebuilding of the side-wheel steamer City of Buffalo is the largest job this winter although this is rapidly nearing completion, having been floated after the additional 42 ft. 9 in. had been put in amidship. Only the cabin work remains and this is well under way. All the boats of the Detroit, Belle Isle & Windsor Ferry Co. have been docked for repairs on account of damages received in the heavy ice. The Pleasure and Promise will be floated next Monday. The steamer Alfred Mitchell will be next in dock for a new wheel and the sandsucker C. H. Little will follow for two wheels and a general recaulking. The steamer Blanchard will be next for recaulking and after her the Richardson steamer Devereux will be docked for repairs to bottom for damages caused by striking the sunken Glidden. She also gets a new mast. The yacht Guinalda will receive a new wheel and then in turn the three big car boats, Pere Marquette No. 14, Ste. Ignace and Ste. Marie for a general overhauling. These car boats had many rough experiences in the ice this winter and Pere Marquette No. 14 lost one wheel, a rudder and part of one of the shafts in Lake St. Clair while en route to Port Huron on her second attempt to buck the heavy ice.

The Great Lakes Engineering Works is progressing steadily with the freighter R. W. England, building for Frank Seither and others.

The St. Lawrence terminus of the Great Lakes & St. Lawrence Navigation Co., better known as the Wolvin Line, has been transferred from Quebec to Montreal. Mr. G. T. Smith, the general manager of the company, says that they find the accommodations at Quebec limited and that as all the St. Lawrence ocean business is managed from Montreal, the company felt Montreal to be more desirable for office headquarters. He says that the company intends to have fifteen steamers in service during the coming season.

Russel W. Davenport, one of the leading metallurgists, died at Philadelphia last week of pneumonia. Mr. Davenport was one of the best known authorities of the manufacture of steel for guns and armor plates. He was formerly general manager of the Bethlehem Steel Works, but at the time of his death he was general manager of Cramp's ship yard.

Marine Industry in the Dominion.

Toronto, Ont., March 9.—The season of navigation for 1904 so far as Canada is concerned will not be a very profitable one, so far as the through freights are concerned, owing to the numerous additions to the fleets that were made in 1903, and the further additions that will be made during the year. Generally speaking, the shipping men are looking to the freight rates being lower even than in 1903, as there is not so much grain to move east from the head of the lakes, and the trade westerly will not be as heavy as last year, as there have been large contracts for steel rails placed in the United States, which in 1903 were placed in England and Germany, and brought out in the new vessels which were built in Great Britain. The principal feature of the coming season will be the advent of turbine steamers on the lakes. The Turbine Steamship Co. is having a steamer built by Hawthorne, Leslie & Co. of Hebburn-on-Tyne, England, which will be placed on the service in May or June; and the Georgian Bay Navigation Co. is having three steamers at Newcastle-on-Tyne, for routes on the upper lakes, description of which with plans have already appeared in the Marine Review.

In the Maritime provinces practically nothing beyond ordinary repairs are being done to the various steamers. The White Star Line Co. is looking for a new steamer to run on the St. John river route with the *Majestic*, in place of the *David Weston*, which was burned last fall. The Plant Line Steamship Co. is negotiating for the purchase of the *Blue*

Hill from the Queen Steamship Co. of Baddeck, N. S., for a route between Port Hawkesbury and Sydney, N. S.; and negotiations are in progress looking to the establishment of a new service between Digby, N. S., and St. John, N. B., and a steam ferry service between Digby and Granville Beach, N. S., for which new steamers will be required.

At Quebec there is a feeling in favor of establishing a direct line to Liverpool, the Hon. S. N. Parent being at the head of the movement. A new transatlantic line will be started in April between Antwerp, Bordeaux and Montreal. It will be worked in harmony with the Canadian Ocean & Inland Line, and the Canada Lake & Ocean Navigation Co., of which Wm. Petersen & Co., of Newcastle-on-Tyne, is the principal promoter. These lines will give a through connection between European ports and the head of the lakes.

The steamers of the Canada Lakes & Ocean Navigation Co. will be operated as last year, the four turret steamers on the upper lakes and the *A. E. Ames*, *H. M. Pellatt* and *J. H. Plummer* between Montreal and Port Arthur, carrying pack-

age and general freight.

The Richelieu & Ontario Navigation Co. will add a new marine slip to its ship yard at Sorel, Que. At this yard the steamer *Montreal* is being rebuilt and will be ready for service on the Montreal-Quebec run for 1905; and the *Carolina*, which went ashore in the Saguenay last year, is also being rebuilt, and is expected to be completed this season. The *Kingston* and *Toronto*, running between Toronto and Prescott, Ont., are being repainted at Toronto. The *Corsican* and *Spartan* are having repairs to their boilers and are to be repainted; this work is also being done at Toronto.

The vessels of the Merchants' Line running between Hamilton and Montreal, and Cleveland and Montreal, are having the ordinary spring repairs done.

The steamer *White Star*, formerly on the Toronto-Oakville run, which was burned last fall, is lying at the Polson Iron Works wharf, and will not be in operation during the year.

No arrangement has been made to place a steamer on the service for the coming season.

The *Lakeside* and the *Garden City* will, as usual, be on the Toronto-St. Catharines route for the Niagara St. Catharines and Toronto Co. The *Lakeside* is having new boilers put in, as well as having a general overhaul.

The steamers of the Niagara Navigation Co. are having their usual spring overhaul, the *Chicora* being the only one to which special attention has to be given. The work is being done at the Government

dry dock at Kingston, Ont., the hull being thoroughly overhauled, and the engines and boilers being renewed in part; a new cylinder having to be provided to replace one which was broken by a fall when being taken out.

The Polson Iron Works is completing a second lightship for the Dominion government to be placed off Anticosti Island in the Gulf of St. Lawrence, and is building a composite yacht for W. Mackenzie, president of the Canadian Northern railway. Her dimensions are: Length, 82 ft.; breadth, 12 ft. 6 ins.; draught, 4 ft., and she will have a speed of 12 miles an hour.

The steamers and other vessels of the St. Lawrence & Chicago Navigation Co., and of the Victoria Lumber Co. (*Waldie* & *Wright*) are merely having the usual spring clean up.

At Owen Sound the Canadian Pacific railway steamers are having \$40,000 spent on them in general overhauling and re-decoration; the big *Sandford*, owned by R. Watt, is being re-engined; and the engines of the *Hiram R. Dixon*, which was burned last year, are being reconstructed for the *Craw-*



A FAST DISAPPEARING TYPE ON THE GREAT LAKES.

ford Tug Co. at Wearton.

At Collingwood there are eight passenger steamers, ten steel and wooden barges, thirteen tugs, five dredges and seven miscellaneous boats wintering. On these the usual repairs are being made; the Wexford is having some repairs to her engines and new boilers put in; while considerable repairs are being made to a number of the vessels of the Northern Navigation Co.

On Lake Winnipeg a number of new steamers are being built, the Northern Fish Co., the Dominion Fish Co., and the Imperial Fish Co., each having one built for the passenger and freight trade; and the Dominion Fish Co. is having the City of Selkirk practically rebuilt. On the Saskatchewan river there will be a big revival of navigation, the principal feature being the advent of Capt. Coates, who is constructing wharves, docks and a marine slip at Edmonton, for the vessels he is to build. Some other vessels are to be added to the northern rivers and lakes, notably one on the Peace river for the Hudson Bay Co., and a steamer for the Roman Catholic mission on Lesser Slave lake.

SHIP BUILDING AT BATH, ME.

Bath, Me., March 9.—The outlook for shipping, with the present spirit shown by congress, is considered encouraging by experienced shipping men in this city and elsewhere, and

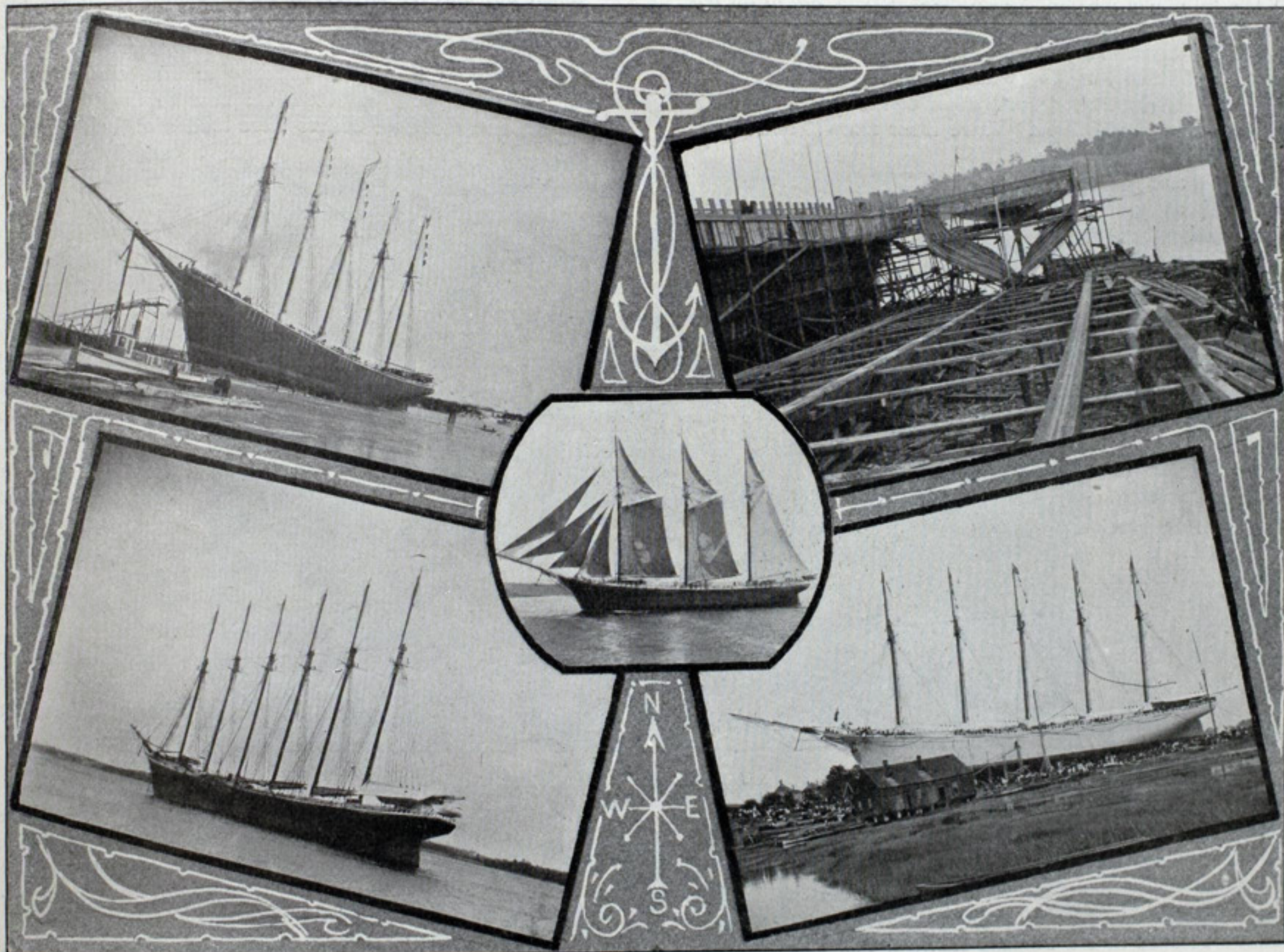
exceptions the weather has been below zero every morning this year—too cold to work out of doors.

At the Bath Iron Works the battleship Georgia is nearly 50 per cent. completed. A large crew are employed. President John S. Hyde of the company said to a Review representative "that recent tangled affairs of the corporation of which the Hyde Windlass Co. and Bath Iron Works are a part are being untangled and now with every promise of fulfillment a vista of many years employment for our mechanics opens before us. Rather than feeling that there is anything dark in the future from this source for our city, I look to see her enjoy even greater prosperity in the future than she ever has in the past."

At the New England Ship Building Co.'s yard three vessels are under construction. Two are four-masters, one for Capt. J. F. Hinckley of this city, and one for Capt. Quillin of Bethel, Del. The other is a five-master of 1,400 tons for Capt. Magnus Manson of New Haven, Conn.

At the Kelley-Spear Co.'s yard two four-masters will be ready for launching in March, one of 600 tons for Nichols Bros. of New York and the other a 700-ton craft for J. S. Emery Co. of Boston. The keel is stretched for a four-masted schooner of 600 tons for Brooklyn, N. Y., parties, to be commanded by Capt. George N. Fletcher.

At E. S. Crosby's yard a crew is engaged upon a four-



RECENT PRODUCTS OF MAINE SHIP YARDS.

how the builders and their customers feel about it is indicated by the following facts: The first two months of this year there have been three launchings with a total gross tonnage of 2,338 tons. The weather has been extremely cold and stormy since the first of the year, which has retarded the work and has interfered with the receipt of material from the south and the northern Maine woods. With one or two

masted schooner of 1,300 tons. All the material is in the yard and the work will be rushed to completion. Last year Mr. Crosby built two four-masters, the John B. Biemiller and Henry F. Kreger. He builds on his own account.

Percy & Small have a big five-masted schooner in frame with a tonnage of over 3,000, and the frame for another five-master has been ordered.



WRECKING CRANE HITCHED TO THE BOILER.

BOILER WORK AT BUFFALO—A CANAL EPISODE.

Buffalo, March 9.—Buffalo is not doing much new hull work just now, a 150-ft. steel scow for the Empire Limestone Co. at the Empire yard being about all. The severity of the winter has prevented operations in a great part of the work, but now that it is relaxing ships are expected to float into the dry docks. It was supposed, in view of the very slack condition of the lake ship building trade, that there was only a small amount of marine boiler work under contract here, but that idea will bear modification. There is an unusual amount of

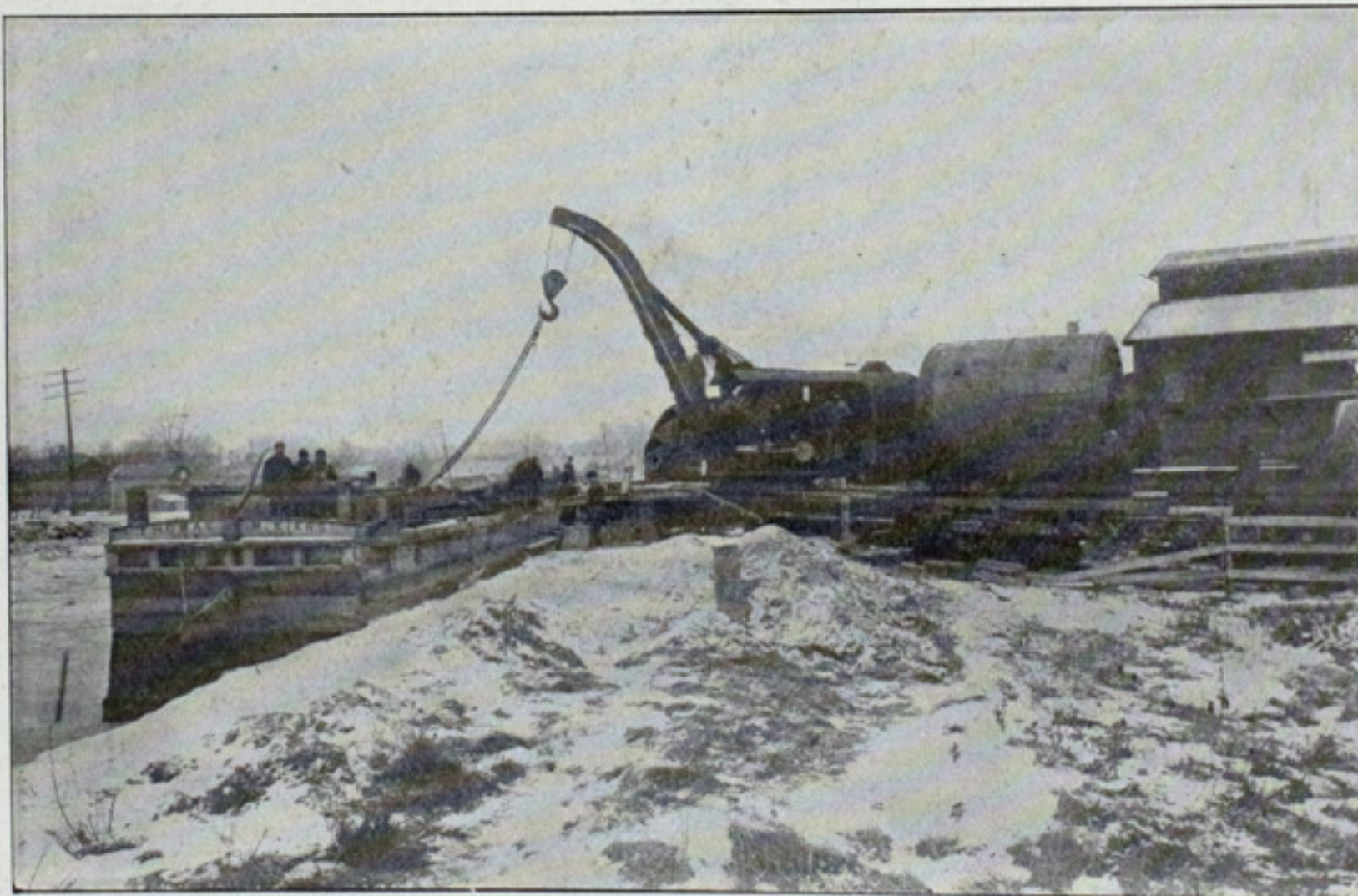
large repair work in hand and at least a fair amount of new boilers under construction. The repair work needed for the spring start is not all ordered yet, so that all the shops in that line will be fully occupied for the remainder of the closed season. Most of the new boiler work is in the shops of the Lake Erie Boiler Co., which is very busy, going far beyond the lake trade for some of its contracts. It has under way a boiler of the ferry-boat type for the Union

Ferry Co. of New York. It is 8 ft. shell by 30 ft. long and is to be delivered April 1. The company has also under way a boiler of the marine type for the tug Gertrude of the Buffalo Dredging Co., 7½ by 12 ft. dimensions; boiler for the steamer Finance of the Panama Railroad Co., dimensions 10 by 10 ft., Scotch type, is to be ready April 15; also two boilers for the new steamer R. W. England, building by the Great Lakes Engineering Works at Detroit, 12 by 12 ft. dimensions and to carry 180 lbs. steam; also two boilers for the Heffernan Engineering Works at Seattle, Wash., Scotch type, 11 ft. 3 in. by 13 ft. dimensions, for steamer not named.

In this connection should be mentioned the building, and especially the delivery early in the winter, of three boilers the number are the Gratwick No. 2, Huron, the Lehigh Valley

for the Heffernan Works, to go into one of the steamers of the American-Hawaiian Steamship Co. The order was for delivery in New York Dec. 15. Being too large for railway transportation they were completed Nov. 12 and sent forward by canal, but only to be frozen in at Canastota in the big freeze-up of Nov. 28. The builders were not to be beaten by the elements in this way, so an arrangement was made with the New York Central railroad to take them on for Albany. A track was laid from the boat to the road, quite a distance, and the three boilers were loaded on half a dozen

cars by means of a wrecking derrick owned by the road. Being too large to go through the bridges here and there they sometimes had to be unloaded and shoved through any way that could be devised. At Albany the Hudson was frozen up and the boats had stopped, so the rail trip was continued as far as Newburg, where a lighter took them to New York, getting them there inside of the specified time. The boilers are 12 ft. 4 in. by 12 ft., Scotch type, with three



BUILDING A RAILWAY TO THE CANAL BOAT.

furnaces, to carry 180 lbs. steam and weigh 35 tons each. This is a little engineering achievement on the side and not contemplated in the contract, that is decidedly unique in the history of boiler making.

The Lake Erie Boiler Co. is also doing considerable of the larger boiler repair work in the harbor, chief among this is the rebuild of the boilers of the Anchor Line steamer Codrus, which will cost about \$10,000. Considerable work has also been done on the liners Boston, North West, North Land and others.

Howard & Roberts have a host of repair work on hand or lately finished, including a list of not less than fifty steamers, doing everything pertaining to that line of business. Among

and Union Line steamers, and all but one or two of the Anchor liners, the City of London, Germanic, and many others.

The William Oldman Co. has work more or less extensive on the boilers of the Sitka, Helena, Progress, Iron Chief, Vega, Maytham and several tugs, with quite an amount of work in sight, but not yet under contract.

The Frontier Engine Works is busy on a pair of double engines for Dredge No. 1 of the Donnelly Contracting Co., 10 by

10, and is reboring engine cylinders on the North Star, Northern Light, Andaste and others. Much work is on hand for the United States Cast Iron Pipe & Foundry Co in the line of large pipes, also double core hoisting machinery for the same company.

Farrar & Trefts have lately doubled their general iron work, but are not doing a very large amount of marine boiler work. They are rebuilding the boiler of the Anchor liner Alaska and are doing a considerable furnace and flue replacing on the Mutual liners Northern Light and North Wind and the Western liner Troy.

Riter & Cousins are at work on the rebuild of four furnaces of the steamer Chili.

William H. Tashenberg & Co. have the boiler of the Gordon Campbell under rebuild and have orders for boiler work on several harbor tugs. This shop has just done a lot of miniature boiler work in the form of twenty 475-lb. affairs that are to run on the grounds of the St. Louis fair. The engines are made at Niagara Falls. A similar order for the boilers to engines for Coney Island is being filled.

It is complained that the boiler work in Buffalo harbor has been taken at too low prices generally, even so that some of the jobs will not pay cost. Competition seems to have been altogether too sharp.

REPAIR WORK AT MILWAUKEE.

Milwaukee, March 9.—Prospects of a late opening of navigation and the possibility that many vessels will not be placed in commission until in July, if they leave port at all, has made this winter a comparatively dull one in "fitting out" boats at the harbor of Milwaukee, despite the fact that the 150 boats now in port here constitute the biggest winter fleet this city has ever had. "If the boats may not be put in commission at all," argue the owners, "why should we overhaul them now?" As a result of this feeling on the part of the owners of the lake carriers, the principal work on Milwaukee boats is being done on passenger liners.

The Goodrich company has received plans for a boat 10 cost \$600,000, but has reached no decision concerning the construction of it. In addition to this, the Goodrich Line is making repairs in the way of general overhauling on its fleet of nine boats, which will approximate \$75,000. Six of these boats are now at the docks at Manitowoc, undergoing repairs—Christopher Columbus, Virginia, Atlanta, Indiana, City of



LIFTING THE BOILER UPON THE CARL.

Sheboygan, and City of Chicago. The City of Racine, Iowa, and Georgia are still in service, but will be repaired before the spring season is opened.

The Crosby Line is now making alterations on its steamer Nyack, at Ferrysburg, Mich., which will include the addition of an upper cabin and a new pilot house. Similar repairs will be made on the Naomi as soon as the Nyack is finished. This will give each of these vessels a berth capacity of 175.

The Barry Line will add sixteen new staterooms and a social hall to the upper cabin of the steamer Empire State, which it acquired last fall after the ill-fated Detroit-Cleveland run ended in a marshal's sale. The City of Fremont and the F. & P. M. No. 1 of the same line will be thoroughly overhauled before they are put into service on spring schedules.

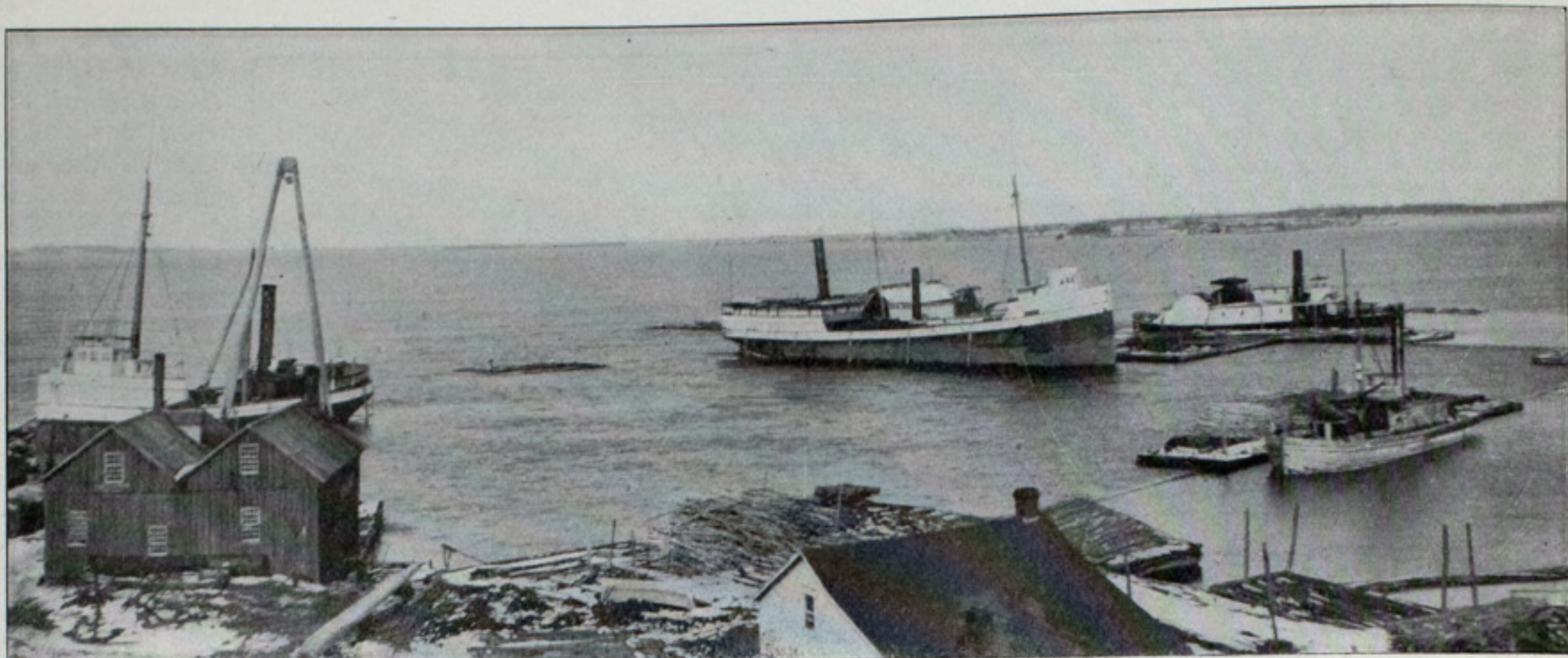
Among the repairs which have been made at the docks of the Milwaukee Dry Dock Company this winter are the following: I. W. Nicholas, bottom repairs; Colonel, bottom repairs; Minnie E. Kelton, rebuilding; Emma E. Thompson; A. J. McWilliams, bottom repairs; Siberia, A. P. Wright, Alexander Nimick, Charlemagne Tower, recaulking.

Work also has been done on the Pere Marquette 19, the carferry which stranded on the rocks of Fox Point Feb. 6. A large number of boats in the harbor still have the coal cargoes which they brought to this harbor last fall, and until these have been unloaded, no repairs will be made on them.

FERRYBOATS FOR LACKAWANNA RAILROAD.

Contracts have been awarded to the Newport News Ship Building & Dry Dock Co., Newport News, Va., by the Lackawanna railroad for four large, steel screw, double-decked ferryboats, to be operated in connection with their new Twenty-third street ferry in New York harbor. As in the designs of the ferry terminal, no expense has been spared by the Lackawanna road to make these new ferryboats a distinct advance over anything that has been attempted in the ferry service of New York. The new boats will have a length of 231 ft., a beam of 62 ft., a draught of water of 10 ft. 6 in. The steam will be supplied by two Scotch boilers for two sets of compound engines, the horse power being 1,300, and the speed 14 miles an hour. The plans show a boat considerably larger than the largest ferryboats now operating on the North river, designed with special reference to handling large crowds comfortably, and making regular trips through conditions of storm and ice. Special attention has been given to the sub-division of the hull by watertight bulkheads, so that in case of collision the safety of the public will not be endangered, and the boats will have the strongest construction ever used in ferry service in New York.

Plans have been furnished by Gardner & Cox, No. 1 Broadway, working in consultation with Col. E. A. Stevens.



HARBOR OF GARDEN ISLAND, ONT., HEADQUARTERS OF THE CALVIN COMPANY.

ST. LAWRENCE RIVER TIMBER TRADE.

On this page will be found a general view of the harbor of Garden Island, Ont. It is the headquarters of the Calvin Co.'s rafting business, at the head of the St. Lawrence river. Dileo D. Calvin founded the timber trade at Garden Island in 1837 and has maintained it continuously ever since. At the present time the Calvin Co. is the only firm that rafts timber down the St. Lawrence. Its competitors in times past have been the Collins Bay Rafting Co. and the Clayton Rafting Co. The ship yard shown in the view with the steam barge Simla on the ways was established in 1838, and is probably the oldest ship yard on the chain of great lakes waters to be in continuous service. Of course, its tonnage has always been wooden. It formerly built sailing vessels, principally schooners, but of late years it has undertaken the construction of steam barges and tugs. The Simla is 235 ft. long, 37 ft. beam and 15 ft. deep. She is Canadian-canal size and was built for the timber trade. The Calvin Co. are the sole survivors in the timber trade of the St. Lawrence river, and it is their experience that wooden boats are better than steel for the timber trade, as in loading along shore and not at harbors, they frequently touch bottom. The builder of the Simla is Mr. Thomas Brian, the manager of the Garden Island ship yard.

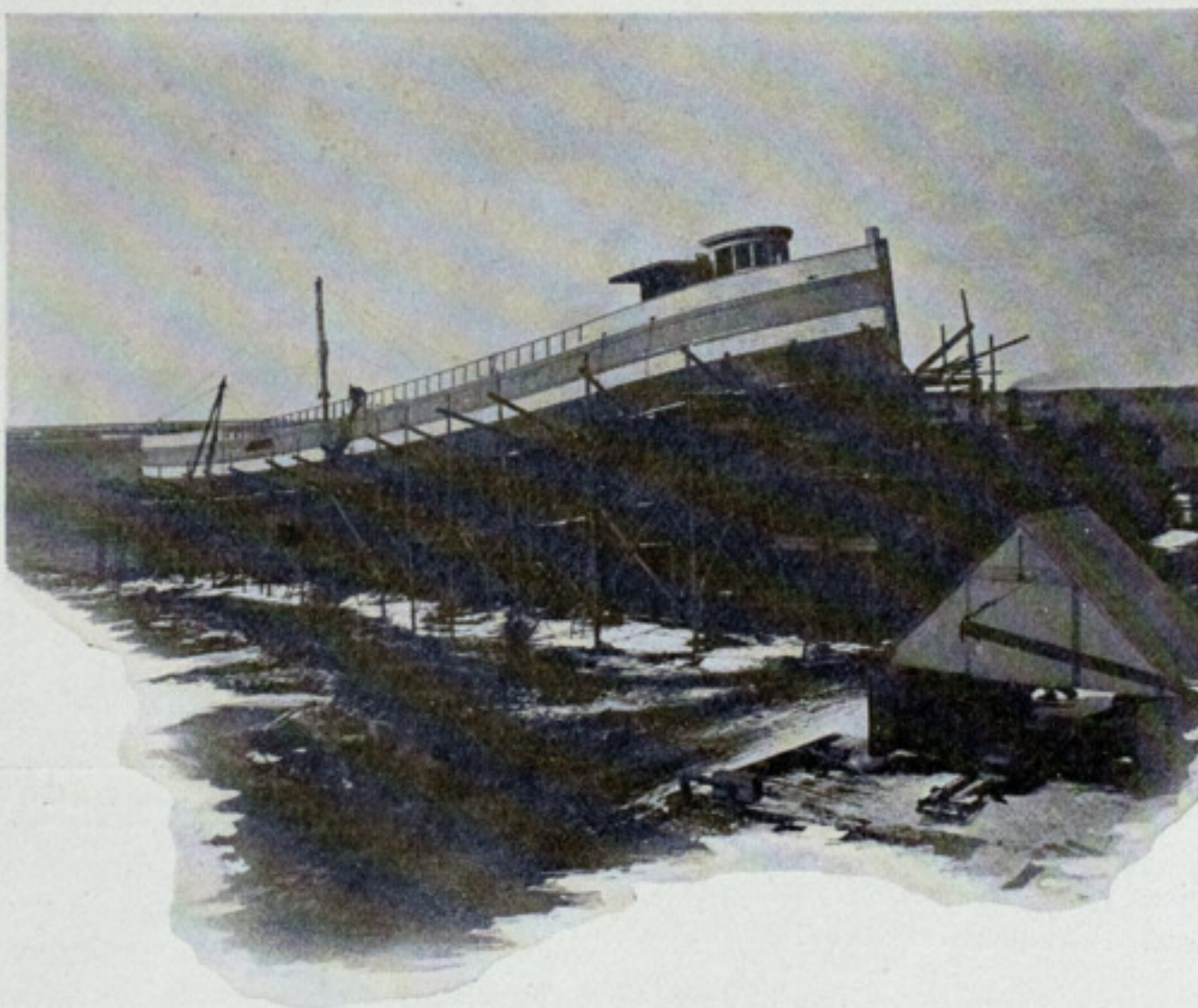
TRIAL TRIP OF ERIE FERRYBOAT TUXEDO.

The Tuxedo, the first of the new ferryboats for the Erie railroad, had a most successful trial trip on Thursday of last week on the North river, New York. Three of these boats were ordered from the designs of J. W. Millard, marine architect, viz: the Tuxedo, Arlington and the Goshen. The Tuxedo has been delivered, the Arlington will be ready for

delivery this week, and the Goshen is now building. Although the wind was blowing half a gale on the day of the trial and the boat presents such a large surface to the wind, she stood up like a church, not showing the least tendency to heel over when the wind was broadside on, thus proving that she has very great stability. She also showed herself to be exceptionally easy on the racks at the landing bridges, and very quick in handling.

The Tuxedo is 224 ft. long over all, which is 18 ft. longer than the newer Pennsylvania and Central railroad ferryboats, 64 ft. wide, and 17 ft. 9 in. depth of hull. She has two compound engines, two Scotch boilers, and a complete outfit of the most modern auxiliary machinery, including two compound dynamos and two large blowers, one for exhausting foul air from the cabins, and one for supplying the passenger

spaces with fresh air. In the cold weather, by passing the fresh air over steam pipe coils it is heated before delivering it in the cabins. In order to largely increase the seating capacity of the boats, a system of cross seats was adopted, which has proved very successful, and which gives nearly 800 seats inside the cabins, exclusive of the seats outside, or an increase of about 60 per cent. over other ferryboats. The boat is of the double deck type, and is arranged for landing passengers from the upper deck, it being the intention to remodel the Erie ferry terminals for this purpose. The trial was a private one, the only persons present besides F. D. Underwood, the president, and other officials of the Erie railroad, being Maurice Featherstone, commissioner of the department of docks and ferries; John A. Bense, chief engineer of the department of docks and ferries; Irving T. Bush, ex-Senator Frank Gallagher, Harry T. Nichols, David C. Reid, president of the Harlan & Hollingsworth Co., the builders, the designer, and a few others.



SIMLA ON THE STOCKS.

SHIPPING COMBINATIONS' NEW HEAD.

Liverpool, Feb. 27.—The appointment of Mr. J. Bruce Ismay to the presidency of the International Mercantile Marine Co. meets with general approval here, but beyond confirming his election the combine officials here decline to say anything about the changes that are predicted will ensue, preferring that Mr. Ismay shall speak for himself when he returns to Liverpool a week hence on board the White Star liner Cedric. Possessing great tact and administrative ability, and having had American as well as British experience in addition to the training he received under his father, the founder of the White Star Line, it is felt that whatever his policy may be, he will do a great deal to establish the shipping combination on a sound commercial basis. The reports that Mr. Henry Wild-



MR. J. BRUCE ISMAY

ing, manager of the American Line in this country, will become head of the White Star Line are thought to be nothing more than speculative rumors. It is more than likely that should the change necessitate Mr. Ismay residing permanently in America, he will be succeeded in Liverpool by one or other of his neutenants, Mr. Sanderson or Mr. Concannon, who likewise are trained men in the splendid organization of the White Star undertakings. Mr. Joseph Bruce Ismay, the new president, is the eldest son of the late Mr. Thomas Henry Ismay, D. L., J. P., founder of the White Star Line, and was born in 1862. He was educated at Harrow, but instead of proceeding to the university he entered the office of his father, in the firm of Ismay, Imrie & Co., and served five years' apprenticeship. Afterwards he became the White Star Line agent at New York, but returned to Liverpool in 1890 and became a partner in the firm. He married in 1888 Julia Florence, daughter of Mr. George R. Schieffelin of New York, and on the death of his father in 1899 Mr. Bruce Ismay was appointed to succeed him as chairman and managing director of the White Star Line. Mr. Ismay is associated with the following important commercial enterprises: International Mercantile Marine Co., president; Oceanic Steam Navigation Co., chairman and managing director; Asiatic Steam Navigation Co., director; British & North Atlantic Steam Navigation Co., director; Liverpool & London & Globe Insurance

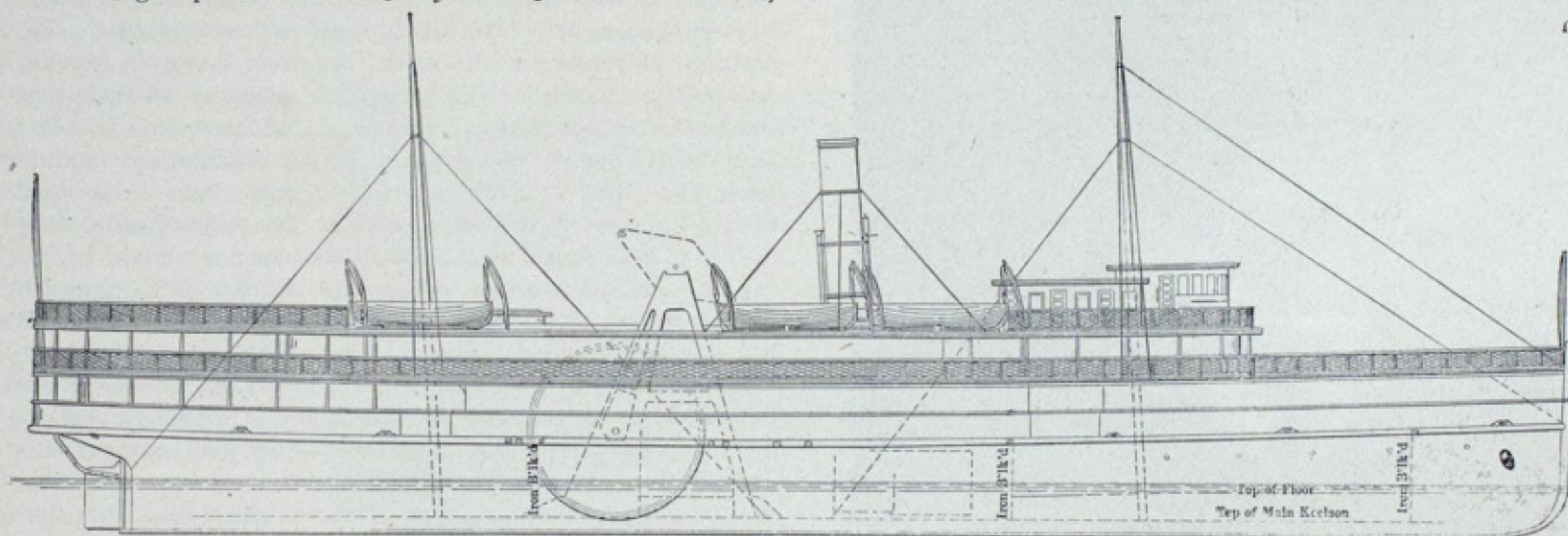
Co., director; Liverpool & London Steamship Protection Association, director; London & Northwestern Railway Co., director; Mississippi & Dominion Steamship Co., director; Pacific Loan & Investment Co., director; and Sea Insurance Co., director.

SHIPPING NEWS FROM SCOTLAND.

Glasgow, Feb. 25.—At the annual meeting in Glasgow of the British Corporation for the Survey and Registry of Shipping, Mr. Francis Henderson, president, said it was two years since he was appointed to the position of chairman, and during that time the success of the registry had been steady and sure. They were now at the end of the thirteenth year of their existence, and notwithstanding the depression affecting shipping interests so seriously, about 130,000 tons of shipping had been added to the registry, and, as compared with last year, there had been an increase in the number of vessels constructed to their class. At present the amount of work on hand was much in excess of that on hand twelve months ago. The tonnage of the vessels at present building exclusively to British Corporation class was nearly 50 per cent. better than at the corresponding date in 1903, and included seventeen cargo vessels, eleven cargo and passenger steamers, six fruit carriers specially designed, one hopper, one tug, and two ferry steamers. The Clyde trust has recognized the importance and value of the work they were doing, by submitting to the officials of the society the plans of all their new dredgers, hoppers or ferry steamers, and entrusting the care and supervision of these vessels during construction to their surveyors. The society deplored the fact that of the total tonnage of vessels classed with them the proportion of ordinary tramp steamers was much smaller than it should be. A registry which had done so much as the British Corporation for the improvement of the modern merchant steamer, which had led the way in so many matters which had simplified design, increased structural strength, and adapted vessels for the safe carriage and economical handling of freight, whose good influence upon practical ship building had been and was being proved continually, if by nothing more than the adoption elsewhere of many of its greatest departures from former practice, was, he thought, worthy to receive a much larger measure of support from the general body of ship owners than it at present obtained. When it was remembered that not only those who supported them, but those who did not, were both alike deriving direct advantage from their existence, it showed a lack of appreciation of facts as they were that so many owners should fail to recognize in a practical manner the benefits conferred upon them by the establishment and continued existence of the British Corporation Registry. It was a source of much satisfaction to the committee that they were closely associated with the most recent and important development in modern shipping, through the classification with them of two 520 ft. fast mail turbine cargo and passenger steamers for the Atlantic service of the Allan Line, and five smaller, but equally fast, turbine triple-screw steamers now being built by Denny of Dumbarton. It was not by any means the first occasion when that registry had been closely identified with important new departures from the methods of those who went before them, by the scientific adaptation of their rules to meet the constantly varying conditions of modern invention. That was just where they differed from other registry societies. The performances of these vessels, embodying the earliest adoption of the turbine method of propulsion to ordinary commercial conditions and long-distance steaming, would be watched with the keenest interest by the whole shipping world, and he hoped some measure of the success they would obtain would be credited to the British Corporation Registry.

Sir William White, ex-chief constructor of the navy, as president of the Institution of Civil Engineers, has just been

here addressing the Glasgow Association of Student Civil Engineers. To Glasgow and the Clyde, he said, we owed very much that had happened in the modern development of civil engineering. He referred to the work of James Watt and Henry Bell, and said he could recite the names of many others who had also done good work. He reminded the society that Glasgow could never have been what it is today but for the civil engineer. The Clyde, within the memory of men he knew well, was not the navigable river it was now, when great ships came and went, bearing the riches of the world and taking away the products of our industries and manufactures. And if the Clyde had not been made what it was by the ability and energy of civil engineers, Glasgow would not be what it is. In this district, no doubt, there were coal and iron, but until they were utilized by the ability and energy of the civil engineer they lay dormant. And Glasgow could not continue to be Glasgow unless the civil engineer was called upon to do still more for this region. It was not long ago that he read after the launch of one of his great battleships that one of the leading ship builders on the river had said that the limit of what could be done had been reached, and that the Clyde was out of date in its present condition. The skill of the ship builder and the enterprise of the ship owner were limited not by what they might undertake but by what would float and go up and down the Clyde. He could not believe,



SHEER PLAN OF SIDE-WHEEL STEAMER J. T. MORSE.

however, that those who in the past had done so much to improve this river and make it what it was had ceased to interest themselves in what was happening. This, perhaps, was largely a matter for their successors, who, in their turn, would see to the necessities of the new conditions. It was a great opening for civil engineers, and some young civil engineers might turn their attention to it, and impress their names upon great works, which would again restore to the Clyde its position of being able to build and receive the most magnificent vessels that the skill of the ship builder could devise. After pleading for a larger representation of ship builders on the membership roll of the Institution, he concluded by remarking that the work of the civil engineer was undoubtedly one of the means by which the British empire was created and must be held together. It was across the sea that our communications lay, and it was by the work of the civil engineer that there would be brought into one great whole those widely scattered provinces in this wonderful empire of ours.

There is nothing like the force of example. The Cunard company have ordered from John Brown & Co., Clydebank, a duplicate of the steamer Caronia which they are having built by that firm. The duplicate, however, will be fitted with turbines instead of reciprocating engines. The Caronia is expected to be delivered in the early part of next year and the new steamer Carmania a short time afterwards. The other vessel, built by John Brown & Co., which has recently been purchased by the Cunard company for their New York and Mediterranean service, has been named the Pannonia.

NEW SIDE-WHEEL STEAMER J. I. MORSE.

The new side-wheel steamer J. T. Morse, designed by William McKie, of East Boston, Mass., and building by him for the Eastern Steamship Co., of Boston, was launched last week. Her dimensions are: Length, 214 ft.; beam, 30 ft.; depth, 12 ft. The steamer is constructed of wood, having oak frames and hard pine planking. Her engine room, on the main deck, is encased in iron. All the space on this deck forward of the aft companionway is designed for freight. From the companionway aft is a dining room 43 ft. long and extending the entire width of the vessel. The remainder of the space aft is occupied by a ladies' saloon and toilet rooms.

The engine, built by the W. & A. Fletcher Co., Hoboken, N. J., will be of the simple vertical beam surface condensing type, having cylinder 51 ins. diameter by 9 ft. stroke of piston. The paddle wheels will be of the feathering type 23 ft. diameter outside of buckets by 8 ft. 9 in. face, ten buckets in each wheel. The engine frame and keelsons will be of steel plate and angles. The boiler department will consist of two return tubular boilers built for a working steam pressure of 53 lbs., each boiler being 9 ft. width of front, 9 ft. diameter of shell and whole length 19 ft., steam chimneys 72 in. outside diameter by 12 ft. high. There will be one large smokestack common to the two boilers. The boilers will be fitted for

attor

both natural and forced draft. Blower will be of the Dimpfel type, having independent steam engine. The boiler department will also be fitted with hydraulic ash ejectors of the Fletcher make. There will also be a suitable donkey boiler with necessary pumps. It is estimated that her speed will be 18 miles an hour at 35 revolutions per minute.

A glass-enclosed saloon extends about two-thirds of the length of the steamer. The smoking room is located in the forward part of the saloon. The purser's office is situated in the saloon directly forward of the steam dome. A walk outside extends completely around the saloon, inside the wheels, and is about 4 ft. in width. The wheel batteries are paneled and have the appearance of forming the inside of a stateroom. There are five large staterooms and one toilet on each side, which are a continuation forward and aft of the wheel batteries, the outside of the rooms being flush with the waterways.

The ship's officers are housed on the hurricane deck. Aft of the pilot house and extending the entire width of the house is the captain's room. Aft of the captain's room are the quarters for the mates, pilots, engineer and electrician. The kitchen is located directly under the dining room, but by means of pipes and ventilators the air is led from the kitchen through the after part of the engine room enclosure, thus removing completely every evidence of culinary employment. The steamer will be lighted throughout with electricity and will possess every modern convenience. The fittings and furnishings will be first class in every particular.

FROM SHIP BUILDERS AND SHIP OWNERS.

The schooner Edward H. Cole was launched from the ship yard of Cobb, Butler & Co. of Rockland, Me., last week.

The usual winter fit-out is being made in the vessels of the Anchor Line of Buffalo to keep them up to the high standard of the company.

The Dunkley-Williams Co., South Haven, Mich., report that they are doing nothing beyond the ordinary fitting-out of each boat which occurs every spring.

The International Mercantile Marine Co., better known as the Morgan shipping combination, reports that it is doing no building or building work at the present time.

The Baker-Whiteley Coal Co. of Baltimore has placed a contract with John Dialogue & Co. of Camden, N. J., for a steel tug, 120 ft. long, to be delivered during the summer.

The Northern Navigation Co., Collingwood, Ont. is making extensive repairs to its steamer United Empire. The work is being done by the Collingwood Dry Dock Co., Collingwood, Ont.

The Northern Steamship Co., Buffalo, N. Y., report that they are making no further improvements or changes in their vessels than would be covered by perfect fitting-out during the winter.

The White Star Line of Detroit is giving its steamers a general overhauling and thorough renovating, and some new furnishing and fittings. The steamers of this company are all of steel and are built for a special trade.

Wm. H. Reed of Rockland, Me., has leased the East End Yacht Club property and will convert it into a ship yard for the construction of wooden vessels. He will shortly begin work upon a four-master.

The General Mifflin, a steamer built for the quartermaster's department of the United States army, was launched last week from the yard of the Risdon Iron Works, San Francisco. The steamer was christened by Miss Lottie Patten.

The Manitou Steamship Co. of Chicago is only operating at present the steamship Manitou. The equipment of this steamer is in excellent and satisfactory condition and no fitting-out is being done further than some minor interior decorations.

The Goodrich Transportation Co. of Chicago have had plans prepared for a new steamer, but have not definitely decided upon building one. It will be some time yet before they arrive at any conclusion. The vessels of the fleet are now undergoing the ordinary course of fitting-out.

The Clyde Line of New York has given a contract to Cramp's of Philadelphia for a new steamship to replace the Kiowa, which was lost last year. The new steamer will be of steel, 345 ft. long, 45 ft. beam and 29 ft. deep, and will be designed principally for freight.

Read Bros., Fall River, Mass., are building a steam fishing boat, 65 ft. long and 15 ft. beam; and also a 43 ft. water-boat with 11½ ft. beam and which is to be equipped with a 20 H. P. Standard motor. She is building for Mr. J. K. Sullivan, and is to be used mainly in Newport harbor and vicinity.

Congressman Thomas S. Butler has secured the promise of Secretary Moody that when the time comes to give a name to the first of the new scout ships to be constructed it shall be called Chester. This is deference to a city where a great many naval ships were constructed by old John Roach, whose ability as a constructor of government craft is known the world over.

The New York & Texas Steamship Co. of New York, better known as the Mallory Line, are installing new boilers and giving a thorough overhauling to their steamship Nueces at Wilmington. Contract has also been given to the New York Ship Building Co., Camden, N. J., for new boilers for the steamer Cancho. A thorough overhauling will also be given to this steamer.

The Diamond Jo Line, St. Louis, Mo., has added one new steamer to its fleet, the new steamer St. Paul, which was finished at Dubuque, Ia., last fall. The company says that she is the largest and finest side-wheel passenger steamer on the Mississippi river and will accommodate in staterooms about 350 passengers. The company has repaired, repainted and refurnished all the other steamers in its fleet, expecting to have a large passenger travel during the World's fair.

The Detroit & Cleveland Navigation Co., with headquarters at Detroit, Mich., report that they are spending about \$50,000 on the Alpena and Mackinac, giving them entirely new social halls, finished in Mahogany, rubber tiling and new decorations and claim that they will compare favorably when completed with all modern side-wheel steamers. These two steamers operate between Detroit and Mackinac island. The company is giving all of its boats a general overhauling, and says that the outfitting and renewal expenses for 1904 will be over \$125,000.

The New Bedford, Martha's Vineyard & Nantucket Steamboat Co., New Bedford, Mass., have installed new electric lighting plants on the steamers Gay Head and Nantucket, and will refit both of the steamers with new plumbing of the open pattern. One of the steamers of the fleet has been offered for sale and if the deal is closed the company will either buy or build a steamer for the season of 1905. The fleet now consists of the steamers Oncatena, Gay Head, Nantucket and Martha's Vineyard. The first is a steel hull; the others are of wood, and all are side-wheelers with beam engines.

The Plant Line, running between Boston, Nova Scotia, Cape Breton and Prince Edward Island, has just completed the overhauling of the steamer Halifax, and she returned to her route on March 2. The steamship Olivette will be overhauled in April and will go on her route June 1. The Plant Line will also operate a steamer on the Bras d'Or lakes, connecting with their line at Hawkesbury and running through the lakes to Sydney, C. B. It is also the intention of the company to build in England a new steamer similar to the Halifax to be ready for the season of 1905.

The Champlain Transportation Co. and Lake George Steamboat Co., with general offices at Burlington, Vt., operating steamers on Lake Champlain and Lake George, report their fleet to be in good condition and to require nothing beyond the ordinary repairs. Two of their steamers, the Beaumont and Sagamore, are new. The steamer Chateaugay formerly had a round wheel house, but the company is now putting in a panel finish to make its appearance more modern. Their wooden steamers, the Horicon, Mohican, on Lake George, and the Maguam on Lake Champlain, are in good condition and no extensive repairs are being made on them.

The freight and passenger steamer Boston, built for the marine service of the New York, New Haven & Hartford railroad, was launched last week at the yard of the Fore River Ship & Engine Co., Quincy, Mass. Her principal dimensions are: Length over all, 318 ft.; length on lower water line, 391 ft. 3 in.; breadth over guard, 63 ft.; breadth of deck, 60 ft.; depth molded, 22 ft. 6 in. She has watertight compartments in the double bottom, while above it the vessel is divided by watertight bulkheads with a collision bulkhead and a watertight collision steel deck, extending back to the stern 11 ft. below the main deck. Her engines are in a steel enclosure. She has steam steering gear and double freight elevators at her forward and aft hatches. The vessel was christened by Miss Mary S. Gardner of New London. Mr. Stevenson Taylor, consulting engineer, together with Mr. J. Howland Gardner and Mr. J. Rogers, assistant marine superintendents, represented the owners. Mr. F. T. Bowles, president; Mr. H. G. Smith, manager; Mr. H. Brown, assistant manager, and Mr. Henry R. Curwen and other officials of the ship yard, were present.

BRITISH NAVAL ESTIMATES.

The British navy estimates for 1904-5 amount to \$184,445,500, a net increase of \$12,160,000 over the estimates for the preceding year. More than half the increase in the estimates is due to the determination to pay the entire balance due on the recently purchased Chilean battleships on April 1 and to provide them with ammunition for the next year. The remainder of the increase arises from expansion of the fleet, increase in pay of the personnel and material.

The estimates provide for a total of \$58,270,880 for new construction, of which \$3,210,415 will be devoted to the laying down of new ships. The admiralty will devote \$9,050,000 to the purchase of armor in the coming year, and says it now has no difficulty in securing an adequate supply of the quality desired. Orders have already been given for nine sub-marine vessels in this year's program, but the preparation of special designs for the tenth sub-marine has delayed the placing of the contract.

Satisfactory advance has been made in the experiments with oil fuel, and three old gunboats have been converted into tank ships for the storing of oil in home ports. Extensive provision is being made to furnish oil afloat.

ITEMS OF GENERAL INTEREST

The Hudson River Day Line, operating exclusively a passenger traffic between New York and Albany, is making extensive alterations in the deck and forward saloon plans of its steamer New York. The band stand is being raised 7 ft. above the main deck, so that it covers the entrance and stairs leading down to the lunch room and cafe. The main forward stairway and offices have been moved aft by the boilers, and the space so cleared gives a large and attractive music room, which commands perfect views on both sides of the Hudson river. Plans are also under way for installing spark arresters in the stacks of the New York to prevent the throwing of cinders on the hurricane deck.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted
The dagger (†) indicates that advertisement appears once a month.

- | | | | |
|---|---|--|---|
| *Allen, John F.....iii | Elphicke, C. W. & Co.....xxxii | Manitowoc Dry Dock Co.....xxv | Ross Valve Co.....xxx |
| Albany Steam Trap Co.....iii | Elwell, Jas. W. & Co.....xxxii | Marine Iron Co., Duluth.....xvi | Russell & Watson.....xxiv |
| Almy Water Tube Boiler Co.....xxvii | Fahey & Co.....xxiv | Marine Iron Works.....v | Sadler, Perkins & Field.....xxxii |
| American Blower Co.....ix | Falls Hollow Staybolt Co.....xxxi | Marine Mfg. & Supply Co.....xvi | Safety Car Heating & Lighting Co.....xxvi |
| American Bureau of Shipping.....xxviii | Faust, Wm. H.....xxxii | Martin-Barriss Co.....xxvii | Sands, Alfred B. & Son.....xxx |
| American Injector Co.....xii | Fitz-Simons & Connell Co.....xxxviii | Mason, H. T.....xxxviii | Scherzer Rolling Lift Bridge Co.....xxii |
| American Line.....xxix | Fix's, S. Sons.....xxxviii | Matteson & Drake.....xxxiii | Schrader's Sons, A.....ii |
| American Ship Building Co.....xi | Fleming & Co., P. H.....xxxii | Meckes, John.....xxix | Seaboard Steel Casting Co.....xxi |
| American Ship Windlass Co.....ii | Fletcher, W. & A. Co.....xxv | Midland Towing & Wrecking Co., Ltd.....xl | Seattle Nautical School.....xxxix |
| American Steam Gauge Co.....xxii | Fogg, M. W.....ii | Milwaukee Dry Dock Co.....x | Shaw, Warren, Cady & Oakes xxxii |
| *American Steam Packing Co.....xxii | Fore River Ship & Engine Co.....xxv | Mitchell & Co.....xxxii | *Shelby Steel Tube Co.....xxvii |
| Armstrong Cork Co.....xl | Forest City Boiler Co.....xxxviii | Mooers Co., H.....xxvii | Sheriffs Mfg. Co.....xxviii |
| Ashton Valve Co.....xx | Forest City Paint & Varnish Co.....xxii | Morse & Son, A. J.....xxxix | Shipowners' Dry Dock Co.....xxv |
| Atlantic Works.....xxv | Frankfort M. A. & P. G. I. Co.....xxviii | Mosher Water-Tube Boiler Co. xxvii | Shipping World.....xv |
| †Atlantic Works, Inc.....iii | | Moulton Steering Engine Co.....xxvi | Shurick, F. S.....xxxix |
| Audel & Co., Theo.....xxxix | | | Siegel-Cooper Co.....xii |
| | | | Sipe & Co., James B.....vi |
| Babcock & Wilcox Co.....viii | Gas Engine & Power Co.....xiv | Nacey, James.....xxxiii | *Smith & Son, Abram.....xxxi |
| Baldt Anchor Co.....xxii | General Electric Co.....xx | Newman & Merryweather.....xxxiii | Smith Co., L. P. & J. A.....xxxviii |
| Baker, Howard H. & Co.....xl | Gilchrist, Albert J.....xxxii | Newport News Ship Building & Dry Dock Co.....xxv | Smith Coal & Dock Co., Stanley B.....xii |
| Bertram's Oil Polish Co.....xxii | Gilchrist & Co., C. P.....xxxii | New Jersey Zinc Co.....vi | Smith, Stanley B. & Co.....xii |
| Blake, Geo. F., Mfg. Co.....xx | Goulder, Holding & Masten.....xxxii | New York Belting & Packing Co.....ix | Smooth-On Mfg. Co.....xxvi |
| *Bliss, John & Co.....xii | Great Lakes Engineering Wks.....vii | Nicholson Ship Log Co.....xxvi | Standard Chain Co.....xxix |
| Bogue, Chas. J.....xxii | Great Lakes Register.....xxviii | Nock, F. S.....xiv | *Standard Oil Co..... |
| Boland, J. J.....xxxii | Great Lakes Towing Co.....v | North River Iron Works.....xxvi | Stark Dredge & Deck Co., C. H.....xxxviii |
| Bonner & Co., Wm. T.....vi | Hall & Root.....xxxii | Northern Engineering Works.....v | Steel, Adam.....xxxiii |
| *Boston & Lockport Block Co.....xxi | Hanna, M. A. & Co.....xxxi | Northwestern Steam Boiler & Mfg. Co.....xxvi | Stirling Co.....viii |
| Bourne-Fuller Co.....xx | Hawgood & Co., W. A.....xxxii | | Stratford Oakum Co., Geo.....xxix |
| Bowers, L. M. & Co.....xxii | Hayden-Corbett Chain Co.....viii | Ostermoor & Co.....xvii | Strothman Iron Co.....xv |
| Brown, Harvey L.....xxxii | Helm & Co., D. T.....xxxii | Otis Steel Co.....xiii | Sturtevant, B. F. Co.....xl |
| Brown & Co.....xxxii | Holmes, Samuel.....xxxii | | Sullivan & Co.....xxxii |
| Brown Hoisting Machinery Co. Inc.....ii | Hoyt, Dustin & Kelley.....xxxii | Pawling & Harnischfeger.....xxvi | Superior Ship Building Co.....x |
| Buffalo Dredging Co.....xxxviii | Hunt, Robert W. & Co.....xxxii | Pearson Boat Construction Co.....xiv | |
| Buffalo Dry Dock Co.....x | Hutchinson & Co.....xxxii | Peck, Chas. E. & W. F.....xxviii | Taylor Water-Tube Boiler Co.....xxvii |
| | Hyde Windlass Co.....xl | *Penberthy Injector Co..... | Thropp, J. E. & Sons Co.....xxx |
| | Hynd, Alexander.....xxxiii | Pere Marquette R. R. & S. S. Line.....xxxix | Thurston & Bates.....xxxiii |
| Chase Machine Co.....vi | | Phosphor Bronze Smelting Co., Ltd.....xxiv | Toquet Motor Co.....xv |
| *Chelsea Clock Co.....xiii | International Mercantile Marine Co.....xxix | Pickands, Mather & Co.....xxxii | Trout, H. G.....xxviii |
| Chicago & Gt. L. Dredge & Dock Co.....xxxviii | Ironville Dock & Coal Co.....xxix | Pinney & Warner.....xxxii | Truscott Boat Mfg. Co.....xxiv |
| Chicago Ship Building Co.....x | Iron & Steel Press Co.....xix | Piper, Geo. W.....xxv | |
| Cleveland City Forge & Iron Co.....xxxii | Jenkins Brothers.....xx | Pittsburg Coal Co.....xi | Union Machine & Boiler Co.....xxxi |
| Continental Iron Works.....ii | Jenks Ship Building Co.....xi | Pittsburg Testing Laboratory, Ltd.....xxxiii | Union Steam Pump Co.....xxviii |
| Contractors' Supply & Equipment Co.....xvii | Kahnweiler's Sons, David.....xxiv | Potter & Potter.....xxxii | Upson-Walton Co.....xl |
| Cory, Chas. & Son.....xxx | Katzenstein, L. & Co.....xxxii | Potter, J. D.....xxiv | U. S. Metallic Packing Co.....xl |
| *Craig Ship Building Co.....xii | Kidd, Joseph.....xxxiii | Powell, Ambrose V.....xxxiii | U. S. Shipbuilding Co.....ii |
| Cramp, Wm. & Sons, S. & E. B. Co.....xxv | *Kieley & Mueller.....xxvii | Prindiville & Co.....xxxii | |
| *Crandall & Son, H. I.....iii | Kingsford Foundry & Machine Works.....xxvi | | Victor Metals Co.....ii |
| Crane Co.....xxiv-xxvii | Kremer, C. E.....xxxii | Record of American & Foreign Shipping.....xxviii | Voss, F. G.....xxviii |
| Cushman Motor Car.....xvi | | Red Star Line.....xxix | |
| | | Rice, Henry.....xxxiii | Walker, Thomas & Son.....xxvii |
| Dake Engine Co.....xxx | Lackawanna Railroad.....xxxix | Richardson, W. C.....xxxii | *Watson-Stillman Co.....xxxix |
| Dearborn Drug & Chemical Wks viii | Lagonda Mfg. Co.....xxi | *Reilly Repair & Supply Co., Jas.....xxiv | Weeks, F. H.....xxxii |
| DeGrauw, Aymar & Co.....xxxi | Lane & DeGroot.....xxiv | Ridson Iron Works.....xxv | Westinghouse Electric & Mfg. Co.....xxvii |
| Delauney, Belleville & Co.....xx | *Learnmonth, Robert.....xxi | *Ritchie & Sons, E. S.....xxviii | White, Johnson, McCaslin & Cannon.....xxxii |
| Delaware River Iron S. B. & E Works.....xxv | Lebanon Chain Works.....xxx | Roach's Ship Yard.....xxv | *Willard, Chas. P. & Co.....xxiv |
| Detroit Ship Building Co.....xi | Lidgerwood Mfg. Co.....xxix | Roberts Water-Tube Boiler Co.....ix | Williams & Rodgers Co.....xxix |
| Detroit White Lead Works.....ii | Lockwood Mfg. Co.....xxv | Rochester & Pittsburg Coal & Iron Co.....xxxii | Wood, W. J.....xxxiii |
| Dixon Crucible Co., Joseph.....xxx | Lovejoy, H. O.....xxxiii | Roelker, H. B.....xxv | |
| Donnelly Salvage & Wrecking Co.....xxviii | L. S. & M. S. Ry.....xxxix | | Youghiogheny & Lehigh Coal Co.....xxxi |
| Drein, Thos. & Son.....xxiv | Lunkeheimer Co.....xxx | | |
| Dunbar & Sullivan Dredging Co.....xxxviii | McCarthy, T. R.....xxxii | | |
| | McCurdy, Geo. L.....iv | | |
| | McNab & Harlin Mfg. Co.....xiii | | |
| | Macbeth Iron Co.....xl | | |
| | MacDonald, Ray G.....xxxii | | |